



REPORTS
ON THE
SANITARY + CONDITION
OF THE
Cardiff Urban Sanitary District
AND OF THE
Cardiff Port Sanitary District,
FOR THE YEAR 1888,

BY
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CARDIFF URBAN SANITARY AUTHORITY.

TOWN HALL,

CARDIFF,

FEBRUARY 11th, 1889.

*TO THE CHAIRMAN AND MEMBERS OF THE
CARDIFF URBAN SANITARY AUTHORITY.*

Gentlemen,

In submitting to you my first Annual Report on the health of Cardiff, I am glad to have the opportunity of expressing my great obligation to your late Medical Officer of Health, for kindly assisting me with his advice on many occasions during the past year.

I would also acknowledge the advantage derived from the perusal of Dr. Paine's reports on the annual progress of sanitary matters in Cardiff. These reports besides containing an account of the success attending the improvements undertaken by the Sanitary Authority at various times, treat in an able and exhaustive manner of many subjects connected with sanitation. In recording the results of his forty years experience as a Health Officer, Dr. Paine has the satisfaction of pointing to a remarkable reduction in the death rate corresponding to the saving of over fifteen thousand lives, and according to Dr. Farrs' estimate a saving in money to the extent of £3,483,000.

The regulations of the Local Government Board prescribe
 " that the Medical Officer of Health shall prepare an annual
 " report to be made to the end of December in each year,
 " comprising a summary of the action taken during the year for
 " preventing the spread of disease, and an account of the
 " sanitary state of his district generally at the end of the year.
 " The report shall also contain an account of the inquiries which
 " he has made as to conditions injurious to health existing in his
 " district, and of the proceedings in which he has taken part or
 " or advised under the Public Health Act 1875, so far as such
 " proceedings relate to those conditions. And also an account of
 " the supervision exercised by him or on his advice for sanitary
 " purposes, over places and houses that the Sanitary Authority
 " have power to regulate with the nature and results of any
 " proceedings which may have been so required, and taken in
 " respect of the same during the year. It shall also record the
 " action taken by him, or on his advice during the year in regard
 " to offensive trades and to factories and workshops. The
 " report shall also contain tabular statements (on forms to be
 " supplied by the Local Government Board or to the like effect)
 " of the sickness and mortality within the district, classified
 " according to diseases, ages, and localities."

This report is therefore made in compliance the with above quoted regulations.

The population of the Borough of Cardiff in the middle of the year 1888, was according to the estimate of the Registrar General 108,570. This population is estimated on the hypothesis that the rate of increase in the last intercensal period has been maintained since 1881, this method although applicable to the kingdom as a whole, may however fail when applied to individual localities. It has been pointed out by Dr. Paine in his recent reports that the population of Cardiff, if estimated in accordance with the above hypothesis would be considerably understated, he therefore represented the case to the Registrar General, who taking into consideration the rapid increase of the population as indicated by the number of inhabited houses on the rate books, introduces the following foot-note :—

"The populations of the twenty-eight towns is estimated on the hypothesis that the rate of increase in the last intercensal period has been maintained since 1881. There are however reasons to believe that by this method the populations of Leicester, Salford, and Bradford are overestimated, and that of Cardiff under-estimated if the population be estimated by the increase of inhabited houses in the rate books, the death-rates for Leicester, Salford and Bradford are under-

stated by one-fifteenth, one-thirteenth, and one-tenth respectively, and those for Cardiff over-stated by one-eighth."

In this report I shall therefore calculate the death-rates on the two estimates of population, the lesser calculated on the usual basis and the greater in accordance with the special formula applicable to Cardiff. The former being 108,570 the latter 122,141 for the middle of the year 1888.

During the latter part of November I caused a careful survey of the town to be made and obtained the following information which I have every reason to believe to be correct according to this return, the population of Cardiff at that date may be estimated as follows:—

Sub-District.		Houses Inhabited.	Houses Vacant.	Houses Building.	Total.	Population.
Cardiff (North)		2,993	198	6	3,197	18,706
,, (South)		4,539	78	14	4,631	28,338
Roath (North)		2,143	188	63	2,324	13,393
, (South)		3,802	165	68	4,035	23,762
Canton	Canton (North)	2,000	271	43	2,314	12,500
	,, (South)	2,155	196	4	2,355	13,468
	Upper Grangetown	501	68	72	641	3,131
	Lower Grangetown	880	41	1	922	5,500
TOTAL		19,013	1,135	271	20,419	118,828
Floating Population					...	7,000
Total Population					...	125,828

The area of the Urban Sanitary District of Cardiff is as follows :—

	Acres.
Parishes of St. Mary and St. John	2791
Parish of Canton	2270
„ Roath	3348
Total	8409

or 13·13 square miles.

The density of the population is 14·7 persons per acre

The town is situated very little above the ordinary level of the sea, the Town Hall being not more than 10 feet above that level. The upper part of the town is built on gravel underneath which is red marl, the lower part on marine clay. A line drawn from Pengam Farm to the railway bridge on Cowbridge Road defines the clay which is marked green on the map.

MARRIAGES.

The total number of Marriages during the year, 31st December, 1888, as furnished by the Deputy Superintendent Registrar were :—

At the Established Churches ...	431
„ Nonconformists	193
„ Catholic	116
„ Synagogue (Jewish) ..	...
„ Registrar's Office... ..	519
	<hr/>
	1,259

BIRTHS.

During the year 1888, the births registered in the Borough were 4409, of these 2259 were males and 2150 females, giving a birth-rate of 40·8 per thousand persons living. The following table gives the birth rate for Cardiff, and for the twenty-eight large towns in England during the year :—

Table 1.

28 Large Towns.	Annual Birth-rate per 1000 Living.				
	1st Qr.	2nd Qr.	3rd Qr.	4th Qr.	Year.
London ...	32·2	30·5	29·7	30·4	30·7
Brighton ...	22·7	23·1	23·8	23·8	23·3
Portsmouth ...	35·5	35·5	35·8	36·3	35·8
Norwich ...	37·4	36·9	32·3	31·9	34·6
Plymouth ...	31·7	34·5	30·2	30·3	31·7
Bristol ...	31·0	30·4	27·8	28·0	29·3
Wolverhompton ...	33·4	35·7	30·7	31·9	32·9
Birmingham ...	31·7	30·9	31·3	29·1	30·7
Leicester ...	34·2	34·2	30·2	32·2	32·7
Nottingham ...	31·3	30·9	28·6	28·7	29·9
Derby ...	30·4	29·9	28·3	29·2	29·4
Birkenhead ...	31·2	31·4	30·5	29·7	30·7
Liverpool ...	31·3	30·2	28·7	28·8	29·7
Bolton ...	33·8	33·1	33·0	30·9	32·7
Manchester ...	37·1	35·4	34·9	34·0	35·3
Salford ...	33·4	32·4	30·7	30·1	31·6
Oldham ...	31·1	31·1	29·4	29·9	30·1
Blackburn ...	35·8	34·1	33·3	33·3	34·1
Preston ...	39·5	36·8	37·1	36·7	37·5
Huddersfield ...	26·5	25·1	22·3	24·6	24·6
Halifax ...	28·7	28·6	28·6	28·3	28·5
Bradford ...	28·3	27·9	26·7	26·6	27·4
Leeds ...	33·3	32·5	32·3	32·3	32·6
Sheffield ...	32·5	30·6	29·8	30·1	30·7
Hull ...	30·3	31·9	32·3	30·1	31·1
Sunderland ...	34·8	37·0	31·0	36·1	34·7
Newcastle ...	37·7	39·5	37·3	37·2	37·9
Cardiff ...	43·9	40·2	40·7	38·3	40·8
28 Large Towns ...	32·5	31·4	30·4	30·6	31·2

It will thus be seen that the birth-rate for Cardiff was higher than that of any of the twenty-eight towns; and that this is not an exceptional circumstance may be seen by the subjoined table extracted from the Registrar General's quarterly returns, which gives the birth-rates of Cardiff compared with that of twenty-eight large towns, for the years 1882—1888 inclusive.

Table 2.

Birth Rate of the large English Towns during each of the past Seven years.

28 Large Towns.	Annual Birth Rate per 1,000 Living.						
	1882	1883	1884	1885	1886	1887	1888
London ...	34.3	33.9	33.6	32.5	32.3	31.6	30.7
Brighton ...	30.6	39.1	29.3	26.0	25.4	25.7	23.3
Portsmouth...	34.0	35.3	34.8	34.5	36.2	36.8	35.8
Norwich ...	33.9	34.1	34.2	33.5	34.7	33.9	34.6
Plymouth ...	32.1	31.5	32.0	30.5	31.6	31.5	31.7
Bristol ...	33.0	32.2	31.5	31.1	30.5	29.7	29.3
Wolverhampton	36.1	36.2	34.6	34.8	35.1	33.2	32.9
Birmingham	36.5	35.6	35.1	33.8	33.0	31.7	30.7
Leicester ...	38.5	37.0	36.5	34.3	34.9	32.8	32.7
Nottingham...	38.1	39.5	39.9	37.6	35.7	33.2	29.9
Derby ...	35.5	35.9	34.5	34.2	33.2	30.0	29.4
Birkenhead ...	36.6	35.4	38.0	34.6	33.7	32.4	30.7
Liverpool ...	36.7	35.2	35.2	33.6	33.5	31.1	29.7
Bolton ...	36.4	34.6	33.3	34.5	34.1	32.5	32.7
Manchester ...	36.7	35.9	36.1	36.3	36.2	35.8	35.3
Salford ...	38.8	35.7	35.6	34.3	34.3	31.9	31.6
Oldham ...	34.9	35.2	35.4	35.6	32.5	31.3	30.1
Blackburn ...	38.4	39.1	37.2	36.6	34.7	35.7	34.1
Preston ...	39.7	38.2	38.7	39.1	39.4	38.4	37.5
Huddersfield	30.8	29.5	29.4	29.1	27.0	27.7	24.6
Halifax ...	30.0	29.0	29.4	28.8	28.8	28.4	28.5
Bradford ...	31.8	29.2	29.2	29.1	28.7	27.7	27.4
Leeds ...	36.1	34.7	34.7	34.6	33.8	33.3	32.6
Sheffield ...	37.4	36.7	36.9	35.0	34.1	32.9	30.7
Hull ...	36.6	36.7	37.8	33.8	33.5	32.8	31.1
Sunderland ...	41.2	41.8	42.6	37.7	36.3	34.6	34.7
Newcastle ...	37.2	36.7	39.5	38.3	39.4	39.1	37.9
Cardiff ...	39.2	39.2	42.3	43.0	42.6	41.1	40.8
28 Large Towns ...	35.3	34.6	34.6	33.5	33.1	32.2	31.2

The following table shows the population, the births, deaths, excess of deaths over births, and excess of births over deaths annually :—

Table 3.

Year.	Population.	Births.	Deaths.	Excess of Deaths over Births.	Excess of Births over Deaths.
1845	13,385	320	324	4	
1846	14,212	381	321		60
1847	15,039	331	484	153	
1848	15,866	428	579	151	
1849	16,693	466	864	395	
1850	17,520	504	485		19
1851	18,354	575	585		50
1852	19,724	696	620		76
1853	21,094	865	644		221
1854	22,464	950	925		25
1855	23,834	1,079	641		438
1856	25,204	1,227	772		455
1857	26,574	1,367	883		484
1858	27,944	1,356	753		603
1859	29,314	1,336	826		510
1860	30,684	1,346	662		584
1861	32,054	1,223	837		386
1862	32,804	1,267	695		373
1863	33,552	1,302	862		440
1864	34,300	1,369	932		467
1865	35,048	1,382	867		515
1866	35,796	1,331	882		449
1867	36,544	1,397	873		524
1868	37,292	1,387	843		544
1869	38,640	1,414	1,005		409
1870	38,788	1,406	903		503
1871	59,494	1,391	891		500
1872	62,086	1,358	916		442
1873	64,674	1,430	995		435
1874	67,262	1,550	885		665
1875	69,850	2,716	1,547		1,169
1876	72,438	2,707	1,455		1,252
1877	75,026	2,772	1,475		1,297
1878	77,614	2,795	1,468		1,327
1879	80,202	2,969	1,428		1,541
1880	82,790	2,893	1,634		1,295
1881	85,378	3,145	1,556		1,589
1882	88,603	3,399	1,724		1,675
	95,168				
1883	91,204	3,526	1,807		1,719
	97,767				
1884	93,468	3,920	2,250		1,670
	100,033				
1885	97,034	4,164	2,487		1,683
	103,599				
1886	100,736	4,270	2,269		2,001
	107,301				
1887	104,580	4,277	2,280		1,997
	111,145				
1888	108,570	4,409	2,212		2,197
	115,185				

DEATHS.

The deaths were 1204 males and 1008 females, making a total of 2212, which were registered and distributed as under:—

Table 4.

			Cardiff.	Roath.	Canton.	Total.
Quarter ending	March	31	292	170	118	580
"	"	June 30	241	147	99	487
"	"	Sept. 29	243	120	89	452
"	"	Dec.	321	193	179	693
Total			1097	630	485	2212

The following table gives the annual death-rates per 1000 of the twenty-eight large towns in England for the years 1885—1888 inclusive:—

Table 5.

Death-rate of the large English towns during the past years:—

28 Large Towns.	Annual Death-rate per 1000 Living.			
	1885.	1886.	1887.	1888.
London ..	19·7	19·9	19·6	18·5
Brighton ...	17·1	17·1	16·9	16·1
Portsmouth ...	19·7	23·8	19·5	18·7
Norwich ...	20·3	23·3	20·4	20·2
Plymouth ...	22·3	23·5	22·7	22·3
Bristol ...	19·7	19·3	20·4	16·9
Wolverhampton ...	20·2	22·2	21·7	20·7
Birmingham ..	19·3	19·9	19·7	17·8
Leicester ...	19·4	19·6	19·0	18·3
Nottingham ...	19·9	20·4	18·7	17·3
Derby ...	18·1	18·2	17·1	16·3
Birkenhead ...	19·5	19·1	21·0	17·8
Liverpool ...	23·8	23·8	23·7	20·3
Bolton ...	20·8	23·1	21·3	21·6
Manchester ...	26·5	26·3	28·7	26·1
Salford ...	21·1	22·1	22·2	21·1
Oldham ...	22·0	22·8	23·8	20·3
Blackburn ...	21·8	25·5	25·5	23·9
Preston ...	27·1	28·9	27·9	23·9
Huddersfield ..	20·1	19·6	23·0	18·5
Halifax ...	19·7	22·7	21·0	19·1
Bradford ...	17·7	19·2	19·9	17·1
Leeds ...	19·9	21·9	21·1	20·6
Sheffield ...	20·7	19·8	21·6	20·5
Hull ...	17·2	18·8	19·3	16·4
Sunderland ...	23·8	19·5	19·7	18·1
Newcastle ..	26·1	22·2	25·3	20·5
Cardiff ...	25·7	22·6	21·9	20·3
28 Large Towns ...	20·5	20·9	20·8	19·2

Table 6 shows the death-rates for Cardiff, based on the two estimates of population, namely, 108,570 and 122,141, during each quarter and that of the entire year, as compared with the death-rates of the large towns :—

Table 6.

				QUARTER ENDING—			Death Rate	
				Mar.31.	June30.	Sept.29.	Dec.29.	of year.
Cardiff: Registrar General's								
Estimate				21.3	17.9	16.7	25.6	20.3
Estimate according to in-								
habited houses ...				18.9	15.9	14.8	22.6	18.0
Twenty-eight large towns				22.1	18.1	16.9	19.8	19.2

The deaths at ages were :—

Under one year of age	620
One year and under five years	339
Five years and under fifteen years	93
Fifteen years and under twenty-five years	151
Twenty-five years and under sixty years	636
Sixty years and upwards,	373
Total	2212

The following table gives the population of each year, the annual deaths from all causes and the death-rates from 1845 to 1888 inclusive :—

Table 7.

Year.	Population	Deaths from all causes.	Death Rates.	Mean of 10 years.	Deaths Zymotic Diseases.	Death Rate.	Mean of 10 years.
1845	13385	324	24.2		51	3.8	
1846	14212	321	22.6		50	3.5	
1847	15039	484	32.2		133	8.8	
1848	15866	579	36.5		186	11.7	
1849	16693	864	51.7		483	28.9	
1850	17520	485	27.7		116	6.6	
1851	18354	525	28.6		81	4.4	
1852	19724	620	31.4		175	8.8	
1853	21094	644	30.5		129	6.1	
1854	22464	925	41.1	32.7	353	15.7	9.8
1855	23834	641	26.9		665	2.7	
1856	25204	772	30.6		136	5.3	
1857	26574	883	33.2		234	8.8	
1858	27944	753	26.9		128	4.5	
1859	29314	826	28.1		212	7.2	
1860	30684	662	21.5		95	3.0	
1861	32054	837	26.1		100	3.1	
1862	32804	695	21.2		122	4.0	
1863	33552	862	25.7		268	7.9	
1864	34300	932	27.1	26.7	250	7.3	5.4
1865	35048	867	24.7		161	4.5	
1866	35796	882	24.6		192	5.3	
1867	36544	873	23.8		116	3.1	
1868	37292	843	22.6		109	2.9	
1869	38040	1005	26.4		156	4.1	
1870	38788	903	23.2		133	3.4	
1871	59494	891	22.5		158	3.9	
1872	62086	916	22.7		234	5.8	
1873	64674	995	24.2		103	2.5	
1874	67262	885	21.2	23.6	154	3.6	3.9
1875	69850	1547	22.1		294	4.2	
1876	72438	1455	20.8		339	4.6	
1877	75026	1475	19.6		255	3.5	
1878	77614	1468	18.9		197	2.5	
1879	80202	1428	17.6		137	1.7	
1880	82790	1634	19.7		306	3.7	
1881	85378	1556	18.2		164	1.9	
1882	88603	1724	19.4		293	3.3	
1883	91204	1807	19.8		253	2.7	
1884	93468	2250	24.0	20.0	476	5.0	3.3
1885	97034	2481	25.5		521	5.3	
1886	100736	2269	22.5		332	3.2	
1887	104580	2280	21.8		278	2.6	
1888	108570	2212	20.3		324	2.9	

The following table shows the total deaths registered, and death-rates during each week in the year 1888:—

Table 8.

No.	Week ending.	No. of Deaths.	Death-rate. Estimated Population as per Registrar General 108,570.	Death-rate. Estimated Population Inhabited Houses, 122,141.
1	January 7	52	24·9	21·5
2	" 14	44	21·0	18·2
3	" 21	48	23·0	19·8
4	" 28	45	21·5	18·6
5	February 4	45	21·6	19·1
6	" 11	48	23·0	20·4
7	" 18	32	15·4	13·6
8	" 25	27	12·9	11·4
9	March 3	53	25·4	22·5
10	" 10	59	28·3	25·1
11	" 17	57	27·4	24·2
12	" 24	32	15·4	13·6
13	" 31	36	17·3	15·3
14	April 7	47	22·6	20·6
15	" 14	44	21·1	18·7
16	" 21	39	18·7	16·6
17	" 28	47	22·6	20·0
18	May 5	34	16·2	14·4
19	" 12	26	12·5	11·0
20	" 19	44	21·0	18·7
21	" 26	40	19·2	17·0
22	June 2	35	16·8	14·9
23	" 9	31	14·9	13·2
24	" 16	34	16·2	14·4
25	" 23	33	15·9	14·0
26	" 30	33	15·9	14·0
27	July 7	29	13·9	12·3
28	" 14	31	14·9	13·2
29	" 21	28	13·5	11·9
30	" 28	34	16·2	14·4
31	August 4	25	12·0	10·6
32	" 11	39	18·7	16·6
33	" 18	41	19·7	17·4
34	" 25	37	17·8	15·7
35	September 1	32	15·4	13·6
36	" 8	38	18·3	16·1
37	" 15	31	14·9	13·2
38	" 22	45	21·6	19·1
39	" 29	42	20·2	17·8
40	October 6	34	16·2	14·4
41	" 13	49	23·4	20·8
42	" 20	48	22·9	20·4
43	" 27	53	25·3	22·5
44	November 3	41	19·6	17·4
45	" 10	48	22·9	20·4
46	" 17	61	29·1	25·9
47	" 24	55	26·3	23·4
48	December 1	58	27·6	24·6
49	" 8	62	29·6	26·3
50	" 15	52	24·9	24·5
51	" 22	67	32·0	28·5
52	" 29	65	31·1	27·6

INFANT MORTALITY.—The rate of infant mortality is conveniently measured by the proportion of deaths of infants under one year to 1000 births registered; the following table gives that rate for Cardiff, as compared with that of the large towns during the years 1885—1888 inclusive:—

Table 9.

Deaths under one year, per 1000 Births Registered.

28 LARGE TOWNS.	1885.	1886.	1887.	1888.
London ...	148	159	158	146
Brighton ...	131	160	149	148
Portsmouth ...	131	174	143	134
Norwich ...	136	202	158	165
Plymouth ...	156	154	196	164
Bristol ...	152	149	149	123
Wolverhampton ...	140	175	176	168
Birmingham ...	157	175	176	149
Leicester ...	193	216	215	203
Nottingham ...	157	180	170	151
Derby ...	137	150	142	143
Birkenhead ...	137	162	156	152
Liverpool ...	174	188	186	168
Bolton ...	160	186	171	173
Manchester ...	175	183	191	177
Salford ...	174	198	195	184
Oldham ...	166	174	187	150
Blackburn ...	170	209	201	189
Preston ...	218	233	214	188
Huddersfield ...	157	167	181	157
Halifax ...	132	171	153	154
Bradford ...	143	167	178	154
Leeds ...	155	181	172	173
Sheffield ...	164	168	177	178
Hull ...	128	164	165	139
Sunderland ...	153	151	151	132
Newcastle ...	172	155	174	136
Cardiff ...	189	168	172	143

The rates of mortality among children vary considerably with the locality and surroundings in which they are placed, and form a sensitive test of the sanitary condition of any particular district. Indeed, the infant mortality as measured by the proportion of deaths of infants under one year to 1000 births, is in many places a far more reliable criterion of the sanitary condition affecting the health of communities than the total death-rate. Sir J. Simon, in reporting on the sanitary condition of the people of England, states "that the death-rates of young children are among the most important studies in sanitary science. In the first place, their tender young lives, as compared with the more hardened and acclimatized lives of the adult population, furnish a very sensitive test of sanitary circumstances; secondly, those places where infants are most apt to die, are necessarily the places where the survivors are most apt to be sickly; and where if they struggle through a scrofulous childhood to realize an abortive puberty, they beget a still sicklier brood than themselves, even less capable of labour and even less susceptible of education. It cannot be too distinctly recognised that a high local mortality of children must almost necessarily denote a high local prevalence of those causes which determine a degeneration of race."

It is satisfactory, therefore, to find on comparing the rate of infant mortality in Cardiff with that of the large towns, that this rate has of late years considerably declined. On referring to Table 9, it will be seen that in the year 1885, there were twenty-five towns with a lower rate of infant mortality than Cardiff, in 1886 there were eleven, in 1887 twelve, and in 1888 five only.

The chief causes of deaths among young children may be classified under the following heads:—Acute Infectious Fevers, Inflammation of the Respiratory Organs, Diarrhœal and Wasting Diseases, Convulsions, and Tubercular Diseases; in fact, all those diseases which are closely connected with density of population, overcrowding and contamination of the air and soil with filth.

ZYMOTIC DISEASES.—The 388 deaths classified under this head included 324 from what are termed the seven chief zymotic diseases, and were registered as follows:—

Small-pox, 4.	Measles, 108.	Scarlatina, 32.
Diphtheria, 8.	Whooping-cough, 54.	
Fever, 36.	Diarrhœa, 82.	

To these I would especially direct your attention, as they are amongst the most important of a group of diseases known as preventable, the mortality from which, therefore, affords a valuable test of the success which has rewarded the endeavours of a sanitary authority to protect the public health.

The following table shows the deaths and death-rates of the seven chief zymotic diseases in each week during the year:—

Table 10.

No.	Week Ending.	SEVEN CHIEF ZYMOTIC DISEASES.		
		Deaths.	Death Rate. 108,570.	Death Rate. 122,141.
1	January 7	1	0.4	0.4
2	" 14	3	1.4	1.2
3	" 21	6	2.8	2.4
4	" 28	2	0.9	0.8
5	February 4	1	0.4	0.4
6	" 11	4	1.9	1.7
7	" 18	1	0.4	0.4
8	" 25	4	1.9	1.7
9	March 3	5	2.4	2.1
10	" 10	1	0.4	0.4
11	" 17	4	1.9	1.7
12	" 24	3	1.4	1.2
13	" 31	3	1.4	1.2
14	April 7	1	0.4	0.4
15	" 14	3	1.4	1.7
16	" 21	0	0.0	0.0
17	" 28	8	3.8	3.4
18	May 5	3	1.4	1.2
19	" 12	2	0.9	0.8
20	" 19	3	1.4	1.2
21	" 26	3	1.4	1.2
22	June 2	2	0.9	0.8
23	" 9	5	2.3	2.1
24	" 16	7	3.4	2.9
25	" 23	5	2.4	2.1
26	" 30	6	2.8	2.5
27	July 7	3	1.4	1.2
28	" 14	1	1.4	1.2
29	" 21	7	3.4	2.9
30	" 28	2	0.9	0.8
31	August 4	0	0.0	0.0
32	" 11	3	1.4	1.2
33	" 18	3	1.4	1.2
34	" 25	3	1.4	1.2
35	September 1	7	3.4	2.9
36	" 8	6	2.8	2.5
37	" 15	6	2.8	2.5
38	" 22	12	5.7	5.1
39	" 29	11	5.2	4.6
40	October 6	7	3.4	3.4
41	" 13	9	4.3	3.4
42	" 20	7	3.4	2.9
43	" 27	14	6.2	5.9
44	November 3	12	5.2	4.6
45	" 10	11	5.2	4.6
46	" 17	18	8.6	7.6
47	" 24	13	6.2	5.5
48	December 1	19	9.1	8.0
49	" 8	24	11.4	10.2
50	" 15	15	7.1	6.3
51	" 22	14	6.2	5.9
52	" 29	9	4.3	3.4

Table II.

Shows in the case of 28 English towns the death-rates from the principal zymotic diseases in the ten years 1877-86 and in 1887 and 1888:—

Towns.	Small-pox.			Measles.			Scarlet Fever.			Diphtheria.			Whooping-cough.			Fever.			Diarrhoea.		
	10 years 1877-86.	1887.	1888.	10 years 1877-86.	1887.	1888.	10 years 1877-86.	1887.	1888.	10 years 1877-86.	1887.	1888.	10 years 1877-86.	1887.	1888.	10 years 1877-86.	1887.	1888.	10 years 1877-86.	1887.	1888.
28 Towns	0.16	0.04	0.07	0.56	0.79	0.47	0.58	0.39	0.29	0.15	0.18	0.21	0.70	0.62	0.59	0.32	0.22	0.20	0.96	0.97	0.59
London	0.28	0.00	0.00	0.58	0.69	0.56	0.47	0.34	0.28	0.18	0.23	0.35	0.76	0.70	0.70	0.27	0.16	0.17	0.78	0.90	0.51
Brighton	0.02	...	...	0.32	0.60	0.03	0.34	0.09	0.07	0.08	0.25	0.20	0.55	0.26	0.41	0.20	0.11	0.12	0.73	0.90	0.51
Portsmouth	0.00	0.02	...	0.50	0.06	0.36	0.15	0.19	0.09	0.40	0.34	0.42	0.43	0.31	0.18	0.68	0.39	0.21	0.90	1.13	0.67
Norwich	0.00	...	...	0.30	1.55	...	0.47	0.39	0.18	0.68	0.23	0.32	0.42	0.56	0.73	0.37	0.19	0.18	1.18	0.79	0.72
Plymouth	0.00	...	...	0.90	0.08	0.90	0.20	0.18	0.09	0.21	0.07	0.14	0.67	0.66	0.05	0.36	0.22	0.21	0.71	1.05	0.14
Bristol	0.01	1.06	0.12	0.41	0.67	0.29	0.40	0.96	0.19	0.07	0.11	0.09	0.59	0.57	0.16	0.27	0.12	0.13	0.60	0.52	0.29
Wolverhampton	0.02	...	...	0.45	0.34	0.46	0.69	0.20	0.20	0.07	0.09	0.12	0.50	0.36	0.71	0.19	0.21	0.17	1.10	1.31	0.72
Birmingham	0.05	0.00	...	0.45	0.53	0.43	0.66	0.08	0.04	0.15	0.13	0.10	0.72	0.87	0.53	0.22	0.17	0.13	1.27	1.28	0.68
Leicester	0.00	...	...	0.42	0.61	0.50	0.56	0.04	0.03	0.08	0.08	0.06	0.47	0.39	0.59	0.22	0.25	0.26	1.83	1.71	1.00
Nottingham	0.03	...	0.07	0.53	0.24	0.50	0.64	0.10	0.43	0.08	0.03	0.13	0.46	0.66	0.34	0.31	0.32	0.40	1.09	1.20	0.55
Derby	0.01	...	0.04	0.27	1.09	0.28	0.26	...	0.33	0.02	0.07	0.07	0.38	0.35	0.56	0.32	0.22	0.29	0.61	0.68	0.31
Hirkenhead	0.02	...	...	0.48	0.84	0.24	0.50	0.90	0.34	0.11	0.10	0.09	0.56	0.33	0.23	0.34	0.25	0.36	0.69	0.77	0.39
Liverpool	0.10	0.00	...	0.86	1.12	0.55	0.77	0.64	0.31	0.13	0.16	0.11	0.80	0.73	0.53	0.59	0.33	0.27	1.20	1.06	0.73
Bolton	0.04	...	0.04	0.84	0.86	0.39	0.12	0.33	0.48	0.06	0.05	0.11	0.64	0.26	0.55	0.24	0.32	0.31	1.40	1.39	0.03
Manchester	0.03	0.01	0.08	0.62	1.88	0.34	0.66	0.65	0.44	0.09	0.20	0.34	0.81	0.54	0.84	0.30	0.32	0.34	1.11	1.26	0.77
Salford	0.07	...	...	0.65	1.47	0.57	0.79	0.72	0.44	0.10	0.10	0.26	0.77	0.30	0.98	0.46	0.37	0.43	1.52	1.49	0.83
Oldham	0.04	...	0.14	0.57	1.26	0.77	0.74	0.77	0.48	0.12	0.41	0.23	0.59	0.76	0.28	0.25	0.20	0.16	0.75	0.63	0.26
Blackburn	0.00	0.03	0.18	0.95	0.78	0.98	0.36	1.36	1.45	0.01	0.01	0.03	0.47	0.79	0.61	0.52	0.34	0.36	1.31	1.06	0.63
Preston	0.01	0.01	0.67	0.81	0.30	0.04	0.51	0.63	0.28	0.11	0.26	0.22	0.61	0.40	0.27	0.52	0.63	0.29	2.39	2.27	1.53
Huddersfield	...	...	0.02	0.47	1.40	0.34	0.18	0.35	0.27	0.04	0.42	0.16	0.49	0.67	0.40	0.16	0.10	0.12	0.49	0.40	0.19
Halifax	0.00	...	0.02	0.41	0.18	0.14	0.27	0.41	0.25	0.09	0.08	0.05	0.24	0.16	0.45	0.29	0.15	0.10	0.43	0.27	0.17
Bradford	0.01	...	0.01	0.37	0.59	0.55	0.55	0.44	0.14	0.07	0.05	0.02	0.50	0.71	0.18	0.26	0.17	0.10	0.84	0.90	0.58
Leeds	0.02	0.00	0.05	0.40	0.50	0.58	0.82	0.33	0.29	0.08	0.03	0.04	0.59	0.38	0.65	0.37	0.30	0.15	1.27	1.15	0.93
Sheffield	0.02	0.88	1.27	0.37	0.91	0.15	1.05	0.65	0.49	0.07	0.06	0.09	0.68	0.55	0.45	0.36	0.25	0.18	1.17	0.94	0.95
Hull	0.03	0.01	0.09	0.35	0.72	0.02	0.86	0.34	0.21	0.07	0.06	0.05	0.52	0.43	0.22	0.37	0.15	0.16	1.43	1.13	0.38
Sunderland	0.13	...	0.01	0.67	1.29	0.01	1.21	0.18	0.15	0.18	0.05	0.11	0.60	0.44	0.37	0.40	0.28	0.22	1.09	0.94	0.48
Newcastle	0.10	0.01	0.0	0.54	1.38	0.06	0.85	0.24	0.17	0.08	0.19	0.21	0.57	0.50	0.44	0.41	0.34	0.19	0.97	0.72	0.39
Cardiff	0.03	0.11	0.03	0.74	0.59	0.39	0.62	0.10	0.29	0.28	0.19	0.07	0.59	0.43	0.49	0.41	0.17	0.33	1.08	0.93	0.76

Table 12.

The following Table gives the total deaths and death-rates of the seven chief zymotic diseases for each year during the six years ending 1887, with mean of same :—

Years.	1882		1883		1884		1885		1886		1887		Mean of Six years.		1888	
	Deaths.	Death- Rate.	Deaths.	Death- Rate.	Deaths.	Death- Rate.	Deaths.	Death- Rate.	Deaths.	Death- Rate.	Deaths.	Death- Rate.	Deaths.	Death- Rate.	Deaths.	Death- Rate.
Estimated Population according to Registrar General.	88,603		91,204		93,468		97,034		100,736		104,580		95,937		108,570	
Seven Chief Zymotic Diseases.																
Small-pox	1	0-011	1	0-010	8	0-085	2	0-020	1	0-009	11	0-105	4-0	0-040	4	0-036
Measles	32	0-361	11	0-120	83	0-888	198	2-040	17	0-168	62	0-592	67-2	0-695	108	0-994
Scarlatina	67	0-756	42	0-460	128	1-369	26	0-267	17	0-168	11	0-105	48-5	0-521	32	0-294
Diphtheria	27	0-503	22	0-241	35	0-374	39	0-402	14	0-139	20	0-191	26-1	0-308	8	0-074
Whooping-cough	38	0-428	68	0-745	31	0-330	118	1-216	46	0-456	47	0-449	58-0	0-604	54	0-497
Fever	18	0-203	35	0-383	34	0-363	39	0-402	73	0-724	17	0-162	36-0	0-373	36	0-331
Diarrhoea	110	1-241	74	0-811	157	1-679	99	1-020	164	1-624	110	1-051	119-0	1-238	82	0-768
Total	293	3-305	253	2-770	476	5-088	521	5-367	332	3-295	278	2-658	358-8	3-779	324	2-994

SMALL-POX.—Four deaths were registered from small-pox during the year.

The following cases came under my observation. On January 18th, a case of small-pox was reported to me in King's Road, Canton. The patient, a foreman carpenter, appears to have contracted the disease in Bristol, which town he visited on December 29th. Twelve days after this date, he was attacked with small-pox. He had been vaccinated when young, but had not been re-vaccinated. Isolation was rigidly enforced, the man's wife, the only other occupant of the house, was re-vaccinated, the bedding and clothes of the patient were destroyed, and the house thoroughly disinfected, by which means the spread of the disease was arrested, no other case occurring in this part of the district.

On May 25th, a case was reported to me on board the s.s. Innis Owen Head, lying in the Roath Dock. On visiting the vessel, I found the cook suffering from small-pox, and immediately ordered his removal to the wooden ward connected with the Hamadryad Hospital Ship, now used for such cases. Subsequently, on the 28th and 29th May, the chief engineer and steward were removed to the hospital, suffering from the same disease.

The details connected with these cases are given in the report to the Port Sanitary Authority.

On October 23rd, my attention was called by the medical attendant to a case of small pox in Cecil-street. On visiting the house, I found that the patient was steward on board the s.s. Levrrington, and that he had been at Barcelona between October 1st and 3rd, about a fortnight before the date of the first symptoms; it is most probable, therefore, that he contracted small-pox at that place. The steamer arrived at Newport on October 16th, the steward together with several of the crew and two passengers, leaving for Cardiff on the following day. Immediately after visiting the patient, and with the consent of the medical attendant, I caused him to be removed to the hospital, and all those with whom he had been in contact re-vaccinated. The usual sanitary precautions were adopted and no fresh case of the disease occurred in the neighbourhood,

On November 12th, my attention was called to a case of small-pox, in a Seaman's Boarding House in Bute Street. The patient, who had never been vaccinated, was removed to the Hamadryad Hospital, where he died on November 14th. All the inmates of the house submitted to re-vaccination, the man's clothing and bedding was destroyed, the rooms thoroughly disinfected, and there was no extension of the disease.

On November 13th, a case occurred in Penarth Terrace, and on the same date I received notice of one in Cranbrook Street. The origin of these cases was obscure, but I have reason to suspect that the disease was in each instance contracted from some undiscovered case introduced into the port by shipping. These patients were removed to the hospital where they died, the disease being of a severe and confluent form—both possessed imperfect marks of primary vaccination, but neither of them had been re-vaccinated.

On November 27th, another case occurred in Cranbrook Street, the disease evidently contracted from the previous one in the same street. This patient, who had not been re-vaccinated, and whose primary marks of vaccination were imperfect, died at the hospital on December 1st. In these cases the usual precautionary measures were adopted, and after this date no other cases of small-pox came under observation.

The history of the above cases affords a good example of the value of efficient vaccination in modifying the virulence of the disease. Of the four fatal cases—one had never been vaccinated, the others were imperfectly protected; whereas all those cases recorded above, who recovered after having the disease in a modified form, were protected by efficient vaccination.

The following statistics shew the saving of life effected by this practice in Cardiff during previous years:—

Table 13.

The subjoined Table shows the total deaths, the deaths from small-pox, and the death-rates per 1,000 per annum from small-pox in Cardiff during the following periods:—

	1847-56	1857-66	1867-76	1877-86	1887	1888
Total Deaths ...	6535	8199	10310	18092	2280	2212
Deaths from Small Pox ...	198	253	88	18	11	4
Death Rate for Small Pox ...	1.04	0.87	0.14	0.022	0.105	0.03

In the examination of these figures it is important to note that during the first decade vaccination was optional, during the second decade it was obligatory, but not efficiently enforced, and during the third and fourth decades vaccination was obligatory, and was efficiently enforced by vaccination officers.

The above table, therefore, clearly indicates the protective influence afforded by vaccination systematically carried out. Owing, however, to the fact that the population undoubtedly contains a large number of imperfectly vaccinated persons, who are really liable to infection, and also, that sometimes the best infantile vaccination in process of time loses its effects, it is advisable that all persons who have been vaccinated in infancy should, as they approach adult life, undergo re-vaccination.

With regard to the protection against small-pox afforded by vaccination, it may be instructive to quote a recently published report of Dr. Buchanan, Medical Officer of the Local Government Board. Dr. Buchanan refers, in the first place, to the relative mortality from small-pox in the vaccinated and in the unvaccinated inhabitants of London, as shown in the following table :—

Comparative Small-pox death-rates among Londoners, of vaccinated and unvaccinated respectively, for the 52 weeks, ended 29th May, 1881 :—

Death-rate of People of subjoined Ages.	Per million of each age of the vaccinated class.	Per million of each age of the unvaccinated class.
All Ages.....	90	3,850
Under 20 years	61	4,520
Under 5 years.....	40½	5,950

Enquiry was also made as to the mortality from small-pox among children under 10 years of age. The population of London under ten in 1881, was 916,784, of whom 55,000 were unvaccinated, and 861,000 were vaccinated. In 1881, 782 small-pox deaths occurred among the 55,000 unvaccinated, as against 125 among the vaccinated. If the London children under ten who were unvaccinated had had the protection which the current vaccination gives, not 782 of them, but at the outside, nine would have died of small-pox during the

year. If the 861,000 vaccinated children had died at the rate of the 55,000 unvaccinated, we should not now be considering 125 small-pox deaths, but we should be confronted with an additional 12,000 and more deaths from small-pox occurring during the year in the London population under ten years of age. This record of the saving of 12,000 lives in one year affords a clear indication of the beneficial operation of the Vaccination Acts.

MEASLES.—The total number of deaths from measles registered during the year was 108, giving a death-rate of 0·994 per 1,000, as against 0·695, the mean of the previous six years.

In laying before you an account of the outbreak of measles which occurred during the latter part of the year, it will be convenient to give extracts from a special report upon the subject made at the request of the Local Government Board.

Table A.

The deaths at ages were as follows :—

Under one year of age	...	...	26
One year and under five years	...	...	76
Five years and under fifteen years	...	...	6
Total	...	...	108

Table B.

The deaths from measles in Sub-Districts were distributed as follows, viz. 1888 : —

Sub-Districts.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Cardiff North	1	..	..	..	..	..	..	..	..	2	3	7	13
" South	..	..	2	..	..	..	..	..	..	5	6	4	17
Roath North	..	..	..	..	..	..	..	..	..	..	4	1	5
" South	..	..	..	..	1	..	..	..	1	..	6	13	21
Canton North	..	..	..	..	..	..	1	..	..	3	7	3	14
" South	..	..	..	..	..	..	..	1	..	2	10	5	18
Upper Grange	..	..	..	..	1	..	..	..	..	..	4	1	6
Lower Grange	..	..	..	..	1	..	..	..	2	2	8	1	14
	1	..	2	..	3	..	1	1	3	14	48	35	108

Death-rate in each Sub-District being :—

Cardiff North	..	0.694	Cardiff South	..	0.599
Roath	..	0.374	Roath	"	0.883
Canton	..	1.120	Canton	"	1.336
Upper Grangetown	..	1.916	Lower Grangetown	..	2.545

Table C.

Return of deaths from measles registered in each week during 1888:—

No.	Week ending.		Cardiff.	Roath.	Canton.	Total.
1	1st Quarter.	January 7	...	...	...	...
2		" 14	1	..	...	1
3		" 21	...	...	...	...
4		" 28	...	...	...	...
5		February 4	...	..	...	...
6		" 11	...	..	...	...
7		" 18	...	...	...	...
8		" 25	...	...	...	...
9		March 3	...	...	...	...
10		" 10	...	...	...	...
11		" 17	..	...	...	..
12		" 24	1	...	...	1
13		" 31	1	...	...	1
Total			3	...	...	3
14	2nd Quarter.	April 7	...	...	...	...
15		" 14	...	...	...	...
16		" 21	...	..	...	...
17		" 28	..	...	...	...
18		May 5	...	...	...	...
19		" 12	...	...	...	...
20		" 19	...	1	...	1
21		" 26	...	...	1	1
22		June 2	...	...	...	...
23		" 9	..	...	1	1
24		" 16	...	...	...	...
25		" 23	...	...	...	...
26		" 30	...	...	...	...
Total ... ..			..	1	2	3
27	3rd Quarter.	July 7	...	..	...	...
28		" 14	..	...	...	...
29		" 21	...	...	1	1
30		" 28	..	...	..	...
31		August 4	..	..	...	...
32		" 11	...	...	1	1
33		" 18	...	...	...	...
34		" 25	...	...	...	..
35		September 1	...	...	...	...
36		" 8	...	...	1	1
37		" 15	...	1	...	1
38		" 22	...	...	1	1
39		" 29	...	..	...	...
Total ... ..			...	1	4	5
40	4th Quarter.	October 6	...	...	...	...
41		" 13	1	...	...	1
42		" 20	1	...	1	2
43		" 27	4	...	4	8
44		November 3	1	1	4	6
45		" 10	1	1	5	7
46		" 17	2	4	7	13
47		" 24	2	1	4	7
48		December 1	4	3	10	17
49		" 8	4	5	7	16
50		" 15	2	4	1	7
51		" 22	2	4	2	8
52		" 29	3	1	1	5
Total			27	24	46	97
Total						108

As bearing upon the possible origin of the outbreak, it may be well to mention that during the year measles was prevalent in the adjoining Urban District of Penarth, especially in the parish of Cogan, which forms part of that district, and in some parts of the surrounding Rural District of Cardiff, and I am indebted to the Health Officers of those districts for the following information.

Dr. Prichard informs me that *no* deaths from measles occurred in the Cardiff Rural District during the year, but that the disease *was epidemic* in the westernmost parishes, having spread from the Cowbridge Union. By April it had spread to the Ely Valley. About *eighty* cases came under his observation, but the real number *was very much higher*.

Dr. Nell states that during the latter part of June, the month of July, and part of August, a large number of cases of measles occurred in Cogan and Penarth, and that during that time *eleven* deaths were registered as having been caused by that disease. The epidemic affected *the whole of the streets of Cogan*, but in Penarth it was confined almost entirely to the parts inhabited by the working classes. Having regard to the intimate relation that exists between those districts and the free intercourse that goes on between them and Cardiff, it was to be inferred that a disease so infectious as measles would readily extend from one to the other, and taking into consideration the situation and surroundings of the earlier cases, it would seem probable that the disease was, on this occasion, *first introduced into Grangetown from the neighbourhood of Penarth and Cogan*. The first cases which came under my observation, and which appeared to be connected with the present outbreak, occurred in the month of May in Rudry Street and Holmsdale Street, Grangetown. The patients were *scholars* attending the Grangetown Board School, and I have strong reasons for suspecting that measles was introduced into that school about that time by some children living at Cogan, from whom the infection spread to those in Rudry Street and Holmsdale Street.

From this centre of infection in Grangetown the disease gradually spread in a *westerly* direction, and by the end of the year it had travelled through most parts of the Urban District, attacking *all those* who were susceptible, and who were exposed to the infection.

To the medical practitioners in the town I am indebted for useful information respecting cases of measles under their care; altogether about *fifty* notices were received by me during the months of September, October, and December. This

although of course, *not* in any way representing the *real number* of cases in the town, formed a valuable addition to the information obtained in other ways.

A careful house to house inspection of the district made by the Inspectors of Nuisances, was the means of bringing to my notice, many cases, and Table D, containing information obtained from both the above sources, gives the number of cases of measles which came under my observation, and the localities in which they were situated.

Table D.

Number of cases of measles under observation during the following months in the year 1888:—

Sub-districts.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Cardiff...	...	...	...	...	...	53	4	7	64
Roath ...	...	...	...	...	2	58	...	6	66
Canton ...	...	...	...	1	4	137	97	91	330
Grangetown ...	2	...	...	...	6	90	17	14	129
Total ..	2	...	...	1	12	338	118	118	589

From the above it will be seen that 589 cases of measles were discovered in the district since the month of May, amongst this number 96 children were found attending school from infected houses. Direct *personal* communication between the *infected and healthy* was established as a fact in many instances, and abundant evidence was found of *unrestricted comingling* in schools. In the absence of systematic notification of infectious disease it is impossible to ascertain the *exact part* played by schools in the dissemination of the disease; but that this was considerable, may be inferred from the fact that towards the end of November, 2385 children were absent from the various public elementary schools in the district.

From the foregoing facts it will be seen that with the *exception* of February, April, and June, measles was *fatally present during each month in the year*, that it prevailed extensively during *October, November, and December*, spreading from *Grangetown* in a *westerly* direction to most parts of the district, that the mortality was *greater* in the *southern* than in the *northern* part of the town, and that the schools *played an important part* in the dissemination of the disease.

It is interesting to note the greater fatality of measles in the low lying southern districts where the soil is impervious and habitually damp, and where the surface water instead of draining away, causes dampness to the foundations of the houses.

During the epidemic of measles in 1884-1885, the death-rate from this disease was 2·78 per 1,000 on the north, and 2·03 on the south of Cardiff. In 1888 the death-rate was 0·71 on the north, and 1·02 on the south. This contrast in the mortality applies, not only to measles, but also to other diseases, especially to those like measles, which owe much of their fatality to complications of the respiratory organs.

The following is a summary of the action taken during the year for preventing the spread of measles.

The necessity for isolating the sick was impressed upon the parents of those suffering from the disease, they were advised to obtain medical aid on the first appearance of premonitory symptoms. Besides verbal instructions as to isolation and disinfection, printed hand-bills were circulated, containing instructions and requesting parents to refrain from sending children to school from infected houses. Managers of schools were communicated with, and required to exclude particular scholars from school; they were also asked to take note of symptoms occurring in any of the scholars that might indicate the commencement of febrile diseases. On several occasions schools were disinfected by the officials of the Sanitary Authority during the ordinary closing hours.

Notwithstanding these precautionary measures, much careless and unnecessary intercourse took place between the sick and healthy, and in this way the disease continued to spread, and the mortality to increase. It became my duty, therefore, to advise the closure of certain schools, in which the attendance was so greatly reduced that their closure appeared to me desirable, and likely to lead to beneficial results.

Accordingly, on the 5th of December, having previously communicated with the managers of these schools, I advised the Sanitary Authority to use the power conferred by the 98th article of the Education Code, and to issue a written notice requiring the managers to close their schools from the 10th of December until the 7th of January, 1889.

At a meeting of the Town Council, held on the 10th of December, the subject was taken into consideration and resolutions passed thereon. Notice was sent to the managers of all the Public Elementary Schools in the district, requiring them to close their schools for the above-named period. All

these schools were consequently closed. Moreover, the proprietors of several private schools were advised to close their schools for the same period, and in many instances complied with the request.

SCARLATINA.—The deaths from this disease during the year were 32 as compared with 11 in 1887. The death-rate was 0·294, and the mean of the six previous years 0·521.

The deaths were distributed as under :—

	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1888.
Cardiff	8	14	1	0	23
Roath	3	4	0	1	8
Canton	1	0	0	0	1
Total	12	18	1	1	32

The total number of cases reported to me amounted to 151. On several occasions scarlatina spread owing to the difficulty of isolating patients in their own homes, this is, of course, especially the case in the dwellings of the poor, where inadequate accommodation renders the complete separation of the sick from the healthy impossible.

Scarlatina is a disease which is, perhaps, more readily controlled, by efficient sanitary administration than any other infectious disease, but without systematic notification, and in the absence of hospital accommodation, the prevention of its spread is difficult.

However, when cases came under my observation, printed and verbal instructions were given to those in charge of the sick, and every practicable means taken to prevent the spread of the disease. It is evident that the prevalence of scarlatina in a district results in a very considerable amount of interruption of education in elementary schools, the length of time during which children living in infected houses, but in good health themselves, have to be kept away from schools often seriously curtails the period which should be devoted to school. The obvious remedy for this evil is the removal of the sick to a suitable hospital, when such removal is necessary to secure isolation.

DIPHTHERIA.—The total deaths from this disease were 8, giving a death-rate of 0·074, against 0·308, the mean death-rate of the six previous years. A careful inspection of the dwellings in which these cases occurred revealed much defective

sanitation ; in all cases notices were served on the owners or occupiers of the premises, and the defects remedied without delay.

WHOOPING COUGH.—There were 54 deaths registered during the year, the death-rate being 0·497 per 1,000, as compared with 0·604, the mean of the six previous years

Whooping cough is a highly infectious disease, and the utter disregard of any precaution in the way of isolating the sick from the healthy leads to its rapid diffusion, when once introduced into a district. It is frequently associated with epidemics of measles, and the culpable neglect arising from the popular belief that children must of necessity have these diseases, adds greatly to the difficulty of enforcing any preventive measures.

TYPHOID FEVER.—The number of deaths during the year were 36, compared with 17 in 1887, the death-rate was 0·331, the mean death-rate of the six previous years being 0·373.

The deaths were distributed as follows :—

Sub-districts.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1888.
Cardiff	5	1	5	3	14
Roath	1	0	2	7	10
Canton	4	2	2	4	12
Total	10	3	9	14	36

The total number of cases of typhoid fever reported to me during the year amounted to 114, a large number of which appeared to owe their origin to defective house sanitation. In each case notice was served on the owner to remedy the defects. The notices were complied with and the work carried out under the superintendence of an Inspector of Nuisances. An outbreak characterised by the suddenness of its appearance, its short duration, and the marked localisation of the cases deserves attention as showing the facility with which milk may become the carrier of this disease.

Suddenly, during the early part of July, my attention was directed to numerous cases occurring in the South Ward in the neighbourhood of Loudoun Square.

The following table gives the locality of the deaths and cases which came under observation at that time, the dates of their origin, and the source of milk supply :—

Table 14.

LOCALITY.	No. of Cases.	No. of Deaths.	Milk Supply.	Date of first Symptoms.
1, Frederica St. (house of milk purveyor) ...	1	...	...	June 10
33, South William St....	1	...	Milk purveyor in Frederica street.	" 22
34, Loudoun Square ...	1	...	do.	" 23
2, South Church St. ...	1	...	do.	" 28
21, Loudoun Square ...	1	...	do.	July 4
42, Peel Street ...	1	1	do.	" 5
7, Hodges Row ...	1	...	do.	" 5
14, South Church St...	2	...	do.	" 6&10
32, Maria Street ...	2	...	do.	" 8
7, Loudoun Square ...	1	...	do.	" 7
56, Loudoun Square ...	1	1	do.	" 7
21, Patrick Street ...	1	1	do.	" 8
14, Maria Street ...	1	...	do.	" 9
50, South William St.	1	...	do.	" 10
45, Westbourne Terrace	1	...	do.	" 10
33, Loudoun Square ...	1	1	do.	" 20
56, Loudoun Square ...	1	...	do.	Sep. 14
Total ..	19	4		

With the exception of Westbourne Terrace, all these Streets are situated within a small and well defined area, and on enquiry I found that the patient in that terrace had recently removed from North Church Street, which is within that area, and where she contracted the disease. Various conditions which might be regarded as influencing the outbreak, such as drainage, water supply, and infected milk supply, were inquired into. The water supply may be at once excluded as a possible cause, all the houses in which cases occurred had a pure supply from the town mains. The condition of the drainage was open to suspicion, and concerning this, it is to be remarked that complaints were numerous respecting the smell arising from the few ventilators which remained in operation, many of these openings having been closed owing to complaints of in-

habitants. The smell was found to be due to the deposit of sewage in the sewers. The main sewer in this district passes from the Windsor Esplanade through Herbert Street into Tyndall Street, the sewage passing in this direction to the out-fall on the East Moors. Some of the tributary sewers which pass into it have insufficient fall, and in one case the invert is below the ordinary flow of sewage in the main sewer, in consequence of which a continual deposit occurs which requires mechanical means to be used in order to keep them in any way clear; but this, together with an extraordinary amount of flushing, appears ineffectual, as at the time of my inspection early in July most of them contained about a foot of offensive deposit, and a general state of congestion of sewage existed extending into the house drains, many of which join the sewers at a level below that of the flow of sewage.

As to the possibility of infection from the sewers, it may be remarked that this influence would, in all probability, have extended further than the district found to be infected; moreover, still greater suspicion was attached to another source of infection, namely, the milk supply. This, which I believe to have caused the outbreak, was supplied from a common source to every infected family coming under observation at this time. One milk purveyor living in Frederica Street supplied every household in which a case of typhoid fever occurred in this district at this time. A careful inspection of the district failed to discover a single house not supplied by this milk in which there was a case of typhoid fever, and no deaths were recorded in any house not so supplied.

The case against the milk was strengthened by the fact that this milk seller's son was at the time of the inquiry convalescent from typhoid fever, and the date of his attack makes it probable that the outbreak was occasioned by the direct infection of the milk. A defective drain was found on the premises, and there is good reason to suspect that the milk, which was stored in a part of the house communicating with this drain, became contaminated with the foul gas charged with the specific poison from the excreta of the patient in the house.

If any further evidence were required to show that the disease was transmitted by this means, it was supplied by the fact that the outbreak ceased suddenly after the distribution of the infected milk was stopped.

DIARRHŒA.—82 deaths were registered during the year, giving a death-rate of 0·768 per 1,000 as compared with 1·238, the mean of the previous six years.

The deaths at ages were :—

Under one year of age	70
One year and under two years...	6
Two years and under five years ...	0
Five years and upwards... ..	6

As usual, a large number of deaths occurred during the summer months, and amongst infants under one year of age. In comparing the diarrhoeal death-rate in Cardiff with that of other towns, it must be remembered that in consequence of the progressively diminishing birth-rate of recent years in the urban districts of England and Wales, there is, doubtlessly, a smaller proportion of infants and young children in the population of these districts than was formerly the case. In Cardiff, however, the birth-rate has gradually increased, so that the proportion of infants in the population of this town is probably greater than formerly. This fact has an obvious bearing on the death-rate from infantile diarrhoea, which has of late years apparently increased.

The average annual death-rate from diarrhoea in the six years 1875-80, was 0·785, and in 1881-6 1·160 per 1,000 persons living.

In the following decennial periods the average rate in the summer quarters, as compared with that of 28 large towns, was—

	Decennial Periods.	
	1872-81.	1878-87.
Cardiff, mean diarrhoeal death-rate ...	2·5	2·6
28 towns	3·5	2·9

From this it would seem that whereas the diarrhoeal death-rate in the large towns has decreased, that of Cardiff has increased; but taking into consideration the abnormal proportion of infants in the population of Cardiff, probably the best method of estimating the comparative mortality from infantile diarrhoea in successive years, will be to calculate the proportion of deaths from it, of infants in their first year of life, to registered births. This method gives the following results, showing that the mortality has really somewhat decreased during recent years.

The average annual deaths of infants from diarrhoea per 1,000 births were in the four years 1881-84 21·1, as compared with 19·3 in 1885-88.

At one time this town was notorious for an excessive mortality from infantile diarrhoea, the death rate from it during the years 1847-54 was 17½ per 10,000 of the population; during the succeeding period, however, the death rate had gone down to 4½.

This extraordinary diminution in the mortality is attributed with good reason to the improved sanitary condition of the town consequent upon the completion of vast drainage works and the provision of a public water supply. Before considering the local circumstances inquired into in connection with the fatal cases, it may be well to allude to those more general conditions which are evidently related to the causation of this disease. Whatever may be the more direct causes of infantile diarrhoea, an increased temperature is a condition necessary to its development; a mean temperature of the air above 60°F. predisposes to it, and the disease is practically absent when the temperature falls below that degree. A reference to the enclosed meteorological tables will shew that the deaths from diarrhoea are almost entirely confined to the third or hot quarter of the year. Some few years ago Dr. Shea, medical officer of health for Reading, propounded the theory that when a hot and comparatively dry summer month follows a decidedly wet month diarrhoea prevails.

In order to test the accuracy of this theory as regards Cardiff, I have extracted from Dr. Paine's reports the meteorological observations and diarrhoeal death rate in the third quarter of the years 1876-88 and find that the evidence is in favour of this view.

The following table gives the result of these investigations, from which it will be seen that the years in which a high diarrhoeal death rate prevailed were the years 1880, 1882, 1884, and 1886, in which a wet July was followed by a comparatively hot and dry August:—

Table 15.
Annual death-rate from Diarrhoea, and meteorological observations in Cardiff during the third quarter of the years.

	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.
Death-rate per 1000	3.4	0.6	3.0	0.6	3.5	0.8	2.8	1.7	4.3	2.2	4.6	2.8	1.4
Mean temp. in each month.													
July ...	66.2	58.7	64.2	59.2	61.6	62.1	60.1	58.4	59.8	63.1	63.0	64.6	58.1
Aug. ...	63.5	61.2	63.0	60.1	68.2	58.7	60.2	60.0	63.1	59.1	62.9	60.2	58.9
Sept. ..	57.6	54.0	58.1	55.8	59.6	56.0	54.3	56.9	59.8	51.3	57.6	51.7	55.8
Rainfall in inches in each month.													
July ...	1.43	4.53	2.01	4.00	66.4	2.62	5.77	3.56	4.05	0.72	4.85	1.51	6.83
Aug. ...	5.79	6.74	1.82	8.12	0.77	6.94	6.75	2.09	2.21	2.74	1.68	2.88	3.50
Sept. ..	6.14	3.58	3.21	4.85	3.67	2.09	3.94	6.14	1.96	6.51	3.08	4.07	1.21

The condition of the soil evidently influences the development of this disease; recent investigations show that diarrhoea prevails chiefly in low lying water-logged districts, in which the soil is and has been for years polluted with sewage and other impurities, and that the purification of the soil and atmosphere consequent upon the drainage of a district invariably improves the public health and that it lowers the general death rate and particularly the diarrhoeal death rate. The above conditions of temperature and soil are such as we know will promote the growth of those peculiar low forms of organisms which have been proved to be connected with certain zymotic diseases. It is doubtful whether the particular microbe, to which diarrhoea is due, has yet been found, but certain experiments recently performed by Dr. Tomkins, of Leicester, seem to indicate that we are not far from this result; he has shown that the air in those districts in which summer diarrhoea was most fatal, contains from three to six times as many micro-organisms or their germs, as the air of the less affected districts, and that certain of the microbes grow in a distinctive manner when artificially cultivated and that the products of their cultivation are capable of producing diarrhoea in the human subject. There can, I think, be little doubt that this form of diarrhoea, which is a specific zymotic disease, is due to some low form of organic life, although the manner in which this organism operates is still a matter for further inquiry.

In previous reports submitted to you by your Medical Officer of Health, it was shewn that during past years the rate of mortality amongst breast-fed infants was exceedingly low, and that the disease was rarely fatal amongst the Irish population with whom artificial feeding of infants is extremely rare. My own observations fully confirm this statement, and lead me to believe that injurious bacteria are introduced into the patient's system with food, and particularly with cow's milk. This article of food, it is well known, is very liable to be affected by foul conditions of air, &c., to which it is frequently exposed, and to special ferments which attach themselves to it. Dr. Vaughan, Professor of Physiological Chemistry of the University of Michigan, seems disposed to connect infantile diarrhoea with the production of poisonous alkaloid, named tyrotoxicon in the rubber nipple or tube of the feeding bottle. However this may be, the fact remains that those infants who are fed naturally by the mother's breast, which food is certainly free from these injurious products, are little liable to infantile diarrhoea.

In Cardiff the Irish population occupies entirely certain streets, so that it is possible to make an approximate estimate

of the death-rate from this disease amongst a purely Irish population, as compared with the general diarrhoeal death-rate in the town. For convenience, I have taken seven streets having an Irish population somewhat exceeding 2,000 persons. The following table gives the diarrhoeal death-rate, per 1,000 estimated on this population, compared with the rate in the entire district during the years 1883-88:—

Diarrhoeal Death-rate in U.S.D. Cardiff.		Diarrhoeal Death-rate in Irish Streets.	
1883	...	0·811	...
1884	...	1·679	...
1885	...	1·020	...
1886	...	1·628	...
1887	...	1·051	...
			0·00
			1·50
			·500
			·500
			·500

The above figures afford evidence of some cause, operating favourably upon the death-rate in the Irish community. It is well known that artificial feeding of infants is exceedingly rare amongst the Irish, and that it is the almost universal custom with them to nurse their infants at the breast: to this I attribute the comparative immunity from infantile diarrhoea amongst them. In support of this view I append the following statistics relating to the alimentation in fatal cases of diarrhoea occurring in the district during the past and present years. In 1882, 1884, and 1885 your Medical Officer of Health made in inquiries with this subject, when he obtained the following information:—

In 1882, out of 110 deaths, one had been fed on breast milk alone, the remainder on animal milk and farinaceous food.

In 1884, out of 110 deaths of infants under one year of age, the diet was as follows:—

Breast milk only	...	...	...	2
Breast milk and other food	...	...	...	9
Cows milk	...	...	...	99
				110

In 1885, out of 76 deaths under one year of age, the diet was as follows:—

Breast milk only	..	...	...	1
Breast milk and other food	..	...	...	3
Cows milk	...	...	...	72
				76

In 1888, I made enquiries into the circumstances connected with all the diarrhœal deaths in the third quarter of the year, and found that out of the total number, viz., 41. The diet was as follows :—

Breast milk only	0
Cows milk only	19
Breast milk and cows milk	17
Breast milk and other food	5
	<hr/>
	41

MORTALITY FROM DISEASES IN CLASSES II., III., IV., AND V.

CLASS II. — Constitutional Disease. — The deaths from these diseases deserve perhaps more attention than they usually receive at the hands of sanitary authorities. Phthisis and other tubercular diseases, which are included in this class, although generally hereditary, are more or less influenced by sanitary surroundings. Pure air, efficient drainage, a dry subsoil, warm clothing, and good food are the conditions necessary for the prevention of these diseases. Prof. Koch has shown that consumption is due to the introduction into the body of a species of bacillus, named by him *Bacillus Tuberculosis*. This bacillus causes in some way the formation of tubercles within the body, and the breathing of air, rendered foul by organic impurity, is one of the conditions required to enable the bacillus to take root and grow in the lungs of human beings. The close connection of this micro-organism with tubercle has been proved (1) by its almost constant presence in tuberculous cases; (2) by its absence in all other diseases, and (3) by pure cultivations of its colonies being injected into the body, causing tubercular disease of the parts inoculated. There is also strong reason to believe that tuberculosis in man sometimes results from eating the flesh or drinking the milk from tuberculous cows. These tubercular diseases, which kill about 70,000 persons annually in England and Wales, must now, therefore, be placed amongst those contagious disorders caused by a micro-organism, the development of which is due to various external conditions, most of which are distinctly under the control of appropriate sanitary measures.

The following table gives the death rate from constitutional, local, and developmental diseases, and from violent deaths during the years 1882-88 inclusive:—

	CLASS II.	CLASS III.	CLASS IV.	CLASS V.
Year.	Constitutional Death-rate.	Local Death-rate.	Developmental Death-rate.	Violent Death-rate.
1882	3·218	8·003	9·210	2·741
1883	3·102	9·210	2·741	1·293
1884	3·423	10·097	3·263	1·326
1885	4·122	10·924	3·091	1·184
1886	4·305	10·373	3·563	1·309
1887	3·203	10·384	3·442	1·400
Mean of six years	3·578	9·831	4·218	1·542
1888	3·306	9·275	2·947	0·994

SANITARY CONDITION OF THE DISTRICT

AND

SUMMARY OF WORK PERFORMED BY THE OFFICERS TO THE HEALTH DEPARTMENT

Notification of Infectious Diseases.—During the year your Health Committee took into consideration the subject of compulsory notification of infectious diseases, and requested me to furnish particulars as to the methods adopted in other towns. On the 31st March, I presented a report upon the subject, of which the following is an extract :—

“ At present, any Sanitary Authority may obtain powers for enforcing notification of infectious diseases either by clauses inserted in local Acts of Parliament, or by a Provisional Order of the Local Government Board, subsequently confirmed by Parliament, but there is reason to believe that the system will shortly be made general throughout the country. The advantage of an early systematic notification of these diseases is so obvious that it is unnecessary to enter minutely into statistics bearing upon the saving of life effected by it, but it may be well to state generally that the death-rate from these diseases has declined in those towns in which compulsory notification is in force. It must be borne in mind, however, that in order to derive full benefit from it, proper hospital accommodation must be provided for the isolation of infectious cases.

“ Various methods have been adopted in carrying out the system; in all the fifty-six towns but two, Aberdeen and Edinburgh, the occupier is bound to give notice to the Sanitary Authority in case no medical man is in attendance. In six towns he is exempted from notification if there is a medical man in attendance, but in forty-eight towns he has to notify in any event; at only one town; Greenock, is the doctor exempted from notifying cases. The three towns that have adopted the method of the medical attendant, handing a

Place.	Date of Act.	Towns in which, when there is a medical man in attendance, it is the duty of occupier to notify the presence of infectious disease.	Towns in which, when there is a medical man in attendance, it is not the duty of occupier to notify.	Towns in which the duty of notifying devolves upon occupier, whether there is a medical man in attendance or not.	Towns in which the medical attendant has to notify presence of infectious disease.	Notice to be given to occupier for transmission to Sanitary Authority.	Fee paid to medical men for each certificate.*	Penalty for disobedience to the provisions of the section as to notification, &c.
Aberdeen	1881	...	...	...	1	...	s. d.	£
Accrington	1882	1	...	1	1	...	2 6	2
Ashton-under-Lyne ...	1886	1	...	1	1	...	2 6	2
Barrow-in-Furness ...	1881	1	...	1	1	...	1 6	2
Birkenhead	1881	1	1	...	1	...	2 6	5l.; second offence 10l.
Blackburn	1879	1	1	...	1	...	2 6	5
Blackpool	1879	1	...	1	1	...	2 6	10
Bolton	1877	1	...	1	1	...	2 6	10
Bradford (Yorks) ...	1881	1	...	1	1	1	2 6	5
Burnley	1883	1	...	1	1	...	2 6	2
Burton-on-Trent ...	1878	1	1	...	1	...	1 0	2
Bury	1882	1	...	1	1	...	2 6	2
Chadderton	1882	1	...	1	1	...	2 6	2
Chester	1884	1	...	1	1	...	2 6	2
Croydon	1884	1	...	1	1	...	2 6	2
Darwen	1887	1	...	1	1	...	2 6	2
Derby	1879	1	...	1	1	...	2 6	2
Dewsbury	1884	1	...	1	1	...	2 6	2
Dundee	1882	...	...	1	1	...	2 6	2
Edinburgh	1879	1	...	...	1	...	2 6	2
Greenock	1877	1	...	1	...	...	...	1
Guildford	1886	1	...	1	1	...	2 6	2
Halifax	1882	1	...	1	1	...	2 6	2
Hartlepool	1883	1	...	1	1	...	2 6	2
Heywood	1883	1	...	1	1	...	2 6	2
Huddersfield	1880	1	...	1	1	...	1 0	10
Jarrow	1884	1	...	1	1	...	2 6	2
Kingston-on-Thames ...	1888	1	...	1	1	...	2 6	2
Lancaster	1880	1	...	1	1	...	2 6	5
Leicester	1879	1	...	1	1	...	2 6	10
Llandudno	1879	1	...	1	1	...	2 6	10
Llanelli	1888	1	...	1	1	...	2 6	2
Macclesfield	1882	1	...	1	1	...	2 6	2
Manchester	1881	1	...	1	1	...	2 6	5
Nelson	1888	1	...	1	1	...	2 6	2
Newcastle	1882	1	...	1	1	...	2 6	2
Norwich	1879	1	1	...	1	1	2 6	5
Nottingham	1878	1	1	...	1	1	2 6	5
Oldham	1880	1	...	1	1	...	2 6	2
Portsmouth	1883	1	...	1	1	...	2 9	2
Preston	1880	1	1	...	1	...	2 6	10
Reading	1881	1	...	1	1	...	1 0	10
Ripon	1886	1	...	1	1	...	2 6	2
Rotherham	1879	1	...	1	1	...	2 6	10
Salford	1882	1	...	1	1	...	2 6	2
Stafford	1880	1	...	1	1	...	2 6	5l.; second offence 10l.
Stalybridge	1881	1	...	1	1	...	2 6	2
Sunderland	1885	1	...	1	1	...	2 6	2
Torquay	1886	1	...	1	1	...	2 6	2
Wakefield	1887	1	...	1	1	...	2 6	2
Warrington	1879	1	...	1	1	...	2 6	5l.; second offence 10l.
West Ham	1888	1	..	1	1	...	2 6	2
Weymouth & Melcombe Regis	1887	1	...	1	1	...	2 6	2
Wigan	1888	1	...	1	1	...	2 6	2
Willesden	1887	1	...	1	1	...	2 6	2
York	1884	1	...	1	1	...	2 6	2
Total—56 Towns...		54	6	48	55	3	...	...

* In several cases only one fee is payable within 30 days to the same practitioner for certificates given by him in respect of the same disease occurring in the same building. The model clause adopted in all recent Acts prescribes a fee of 2s. 6d. for each certificate in respect of cases in private practice, and 1s. for each certificate in respect of cases in public institutions, &c.

certificate of the nature of the disease to the occupier, who is responsible for its transmission to the Sanitary Authority, are Bradford, Norwich, and Nottingham. In my opinion this method offers the most advantages, and is most likely to meet with the approval of medical practitioners (without whose cordial co-operation no plan of notification can be successful). I would advise therefore, that powers be obtained as soon as possible, either by a Local Act or by a Provisional Order, for enforcing notification of infectious diseases, and as some delay must of necessity occur before these powers can be obtained, I would suggest that in the mean time, medical practitioners be invited to send notice of these diseases to your Medical Officer Health, on forms supplied to them, and that a fee of 2s. 6d. be paid for each certificate in respect of cases in private practice, and 1s. for each certificate in respect of cases in public institutions."

I have only to add in connection with this subject, that the Town Council subsequently authorised the payment of a fee of 2/6 for each notice of certain infectious diseases sent to me by medical practitioners, and expressed their intention of obtaining compulsory powers at the earliest possible date.

The following tabular statement taken from Sanitary Record, gives an abstract of the provisions relating to the notification of infectious diseases in Local Acts and Provisional Orders :—

Provision for the Isolation of Cases of Infectious Diseases.—On numerous occasions during the year, the want of a suitable hospital for infectious diseases has been felt. Many deaths, much unnecessary illness, and a large amount of inconvenience and expense have occurred, in consequence of the absence of such an institution.

The present small wooden structure in connection with the Hamadryad Hospital Ship, is the only accommodation for infectious cases occurring in the town and amongst the shipping. It need hardly be said that this place is entirely unsuitable for the purpose. The matter is now engaging the attention of your Health Committee; plans of hospitals and reports upon the subject have recently been submitted by me to the committee and it is to be hoped that before long a suitable site will be obtained, and a hospital erected thereon.

With regard to the amount of accommodation required for the isolation of infectious cases occurring in this district, I have advised that provision should be made for at least fifty patients, and the wards constructed in such a manner that extension would easily be effected when further accommodation should be required. Taking into consideration the rapid growth of the town and port, it would be found economical to have permanent buildings sufficient for somewhat more than the average necessities of the district, so that recourse to temporary extensions may less often be necessary. The site selected should be as dry as possible and easily accessible, special regard being made to the reasonable seclusion of the hospital buildings. The more efficient hospitals constructed by sanitary authorities have been built of stone or brick; wooden or iron buildings are not, as a rule, well adapted to the purpose; they are less durable, and it has been found impossible to maintain in them a sufficient equable temperature. Moreover, they are unattractive in appearance, and the friends and relatives do not readily assent to the removal of patients to such buildings.

Sewerage.—The position and direction of the main sewers are indicated on the enclosed map, from which it will be seen that the principal divisions of the Borough, *i.e.*, Cardiff, Roath, and Canton are provided with systems of sewerage, each having separate outfalls discharging their contents on to the foreshore above the level of low water. Owing to the peculiar physical conformation of the district, and the low level at which the greater part of the town is situated, the sewer gradients are low, consequently the velocity of the sewage is small, the sewers tend to become sewers of deposit, and at times an offensive smell creates a nuisance in the im-

mediate neighbourhood of the street ventilators. In many cases, owing to complaints of the inhabitants, these openings have been closed; this may be, perhaps, necessary in narrow streets and courts, but in the main thoroughfares, where the streets are wide, a better remedy would be to introduce fresh openings, in order to dilute, as far as possible, the foul sewer gas. It must be remembered that air under pressure, if there is no ready means of exit by ventilating shafts, is forced into houses the warmth of the interior of the dwellings, exerting an aspirating action on the colder and heavier air of the sewer.

In increasing the number of ventilators, it may be necessary to combine with ordinary surface ventilators a certain number of shafts carried from the crown of the sewer to the top of buildings away from all windows and chimneys; these will act as exits for foul air, whilst the surface ventilators will act as inlets for fresh air. The nuisance has to some extent been remedied by the introduction of a strong solution of sulphate of iron into the sewers—a practice which has been adopted with advantage whenever complaints have been received concerning the smell from ventilators. During the hot weather this plan has been carried out systematically under the direction of Mr. Woosey, Superintendent of Scavengers.

Water Supply.—The public water supply is at present obtained from the gathering grounds of Lisvane, received into a reservoir at Llauishen containing 80 million gallons, the overflow from which is received into an additional reservoir which has been constructed with a storage capacity of 300 million gallons. In order to meet the requirements of the rapidly increasing town a pumping station at Ely was constructed in 1850 from, which about 1,000,000 gallons per diem may be obtained. The amount of water supplied to the town during the year was 800 million gallons; giving a supply of .8 gallons per head per diem.

The following is the most recent result of the analysis of the town water made by Mr. Hughes, your Borough Analyst:—

Description	Total Solid Matter	Albuminoid Ammonia	Free Ammonia	Nitrogen as Nitrates & Nitrites	Total Nitrogen found	Previous Sewage or Animal Contamination	Chlorine	Magnesia Salts	Hardness		
									Temporary	Permanent	Total
Water from Ely ...	31.2	.006	...	.059	.064	slight	1.50	...	18.8	30.8	44.6
" " Llanishen	22.8	.0085	.0026	.047	.056	...	1.15	...	9.0	9.4	18.4
Limit of Impurity Standard ...	40.0	.015	.010	.100	...	700	3.0	...	5.0	24.0	29.0
Standard of Purity ...	20.0	.004	.002	.050	...	nil	1.5	...	14.0	3.0	17.0

The above table shows that the quality of the water was sufficiently good for dietetic purposes: it is however unusually hard, and at times contains more organic matter than is desirable. In 1884 Parliamentary powers were obtained for a new source of supply, namely from the Taff Fawr water shed of Brecon Beacons, where a reservoir is being constructed, with a storage capacity of 300 million gallons. The amount of water available for the supply of the town on the completion of the works, will be about 8 million gallons per day. The following is the result of an analysis of this water:—

Total solid matter	...	...	...	6·4
Albuminoid Ammonia	...	...	...	·0055
Free Ammonia	...	...	...	·003
Nitrogen as Nitrates & Nitrites	...	...	...	...
Total Nitrogen found	...	...	...	·008
Previous Sewage or Animal Contamination	...	...	...	...
Chlorine	...	...	...	·75
Magnesia Salts	...	...	...	...
Hardness—Temporary	...	...	...	...
Permanent	...	...	...	4·3
Total	...	...	...	4·4

It will be seen, therefore, that when the new supply can be utilized the town will have an almost inexhaustible supply of the purest water, the use of which should be encouraged in every way; there will then be no difficulty in causing every water closet in the district to have an adequate water supply for flushing purposes. At present a considerable proportion of the smaller houses in the town have no flushing cistern attached to their closets, which are flushed by the slop water of the house, or other water thrown in by hand: this imperfect method of flushing invariably leads to obstruction in some part of the apparatus, and is a fruitful source of disease.

The amount of water required for all purposes varies in England from about 20 gallons per head per day to about 50 or 60 gallons. In London the consumption is about 36 gallons per head; in Brighton, about the same; in Glasgow, 50 gallons; and Liverpool will very shortly be supplied at the rate of 40 gallons per head with pure, soft water from the Welsh hills.

With regard to the supply for a town like Cardiff, I am of opinion that from 25 to 30 gallons per head per day is necessary.

Mr. J. F. Bateman, C.E., in his Report to your Sanitary Authority on the Cardiff Water Supply, stated that while 25 gallons per head would really be enough, 30 gallons would be

an ample allowance. Your late Medical Officer of Health, Dr. Paine, in his evidence in 1884, given before a Parliamentary Committee on the occasion of the promotion of a Bill for improving the water supply of Cardiff, stated that in his opinion 30 gallons per head was necessary. Mr. J. A. B. Williams, C.E., Engineer to the Cardiff Waterworks, stated on the same occasion that with great economy we might manage with 25 gallons per head. Taking into consideration the low gradients in the sewers, it would be on the whole wise to allow rather more than the average supply of water per head. Samples of water have been obtained from seven wells, and forwarded to the Borough Analyst for examination. Proceedings were taken in five cases, in which the water was unfit for drinking purposes, and in each case an order obtained from the magistrates to close the wells.

Dairies, Cowsheds, and Milkshops.—The registered purveyors of milk are 285 in number. The cowsheds and premises occupied by milk sellers have been inspected during the year. Some of these places were found in a bad sanitary condition. As a rule the premises of the large milk purveyors are in a satisfactory state, but many of the small dealers store milk in most unsuitable apartments; not unfrequently in sculleries and in close contact with decaying animal and vegetable matter. Milk is peculiarly liable to contamination from numerous sources, it is moreover probable that most infectious diseases can be propagated by it. The infections of scarlet fever, diphtheria, and typhoid fever are to be specially guarded against. It is necessary therefore that a strict supervision should be exercised by the officers of the sanitary authority over the milk supply of the district. An example of this necessity has been given in a previous part of this report. Until recently the regulation of cowsheds, dairies, and milkshops was under the control of the Privy Council and Veterinary Authorities, by virtue of the 34 sec. of the Contagious Diseases (Animals) Act 1878, but by the sec. 9 of the Act of 1886, the control was transferred to the Local Government Board and Sanitary Authorities. Under the same Act the dairies, cowsheds, and milkshops order, 1885 continues in force. This order revokes that of 1879, and gives power to Local Authorities to make regulations for the following purposes or any of them.

a.—For the inspection of Cattle in dairies.

b.—For prescribing and regulating the lighting, ventilating, cleansing, drainage, and water supply of dairies, and cowsheds, in the occupation of persons following the trade of cowkeepers or dairymen.

- c.*—For securing the cleanliness of milk stores, milkshops, and milk vessels used for containing milk for sale by such persons.
- d.*—For prescribing precautions to be taken by purveyors of milk or persons selling milk by retail, against infection or contamination.

As the regulations existing in your district were made under the provisions of the order of 1879 now revoked, I advised the Health Committee to make fresh ones, under the more extended powers given by the order of 1885. This suggestion was adopted and fresh regulations which have received the sanction of the Local Government Board came into force on November 12th, 1888. Copies of the order of 1885, and of the new regulations have been freely circulated amongst milk sellers and others in the district.

Inspector of the District.—In conformity with the regulations of the Local Government Board, a systematic inspection of the district has been made during the year with the following result : —

Table 16. HOUSE INSPECTION.
CARDIFF DISTRICT, 1888.

Name of Street.	Number of Houses Inspected.	Defective Drains.	Choked Drains.	W.C. Pans and Syphons Defective.	Defective Stench Traps permitting an escape of Sewer Gas.	Scullery Sinks connected direct with Drain.	Inside Closets not ventilated.	Closets not supplied with Water.	Other Nuisances.
Louisa Street ...	32	9	..	..	3	..	..	32	2
Frances „ ...	25	4	..	3	..	..	..	25	4
South William St.	49	5	1	2	4	1	..	49	10
Homfray Street	24	..	..	2	4	1	..	24	1
Northcote „	22	1	1	..	9	..	1	22	1
East Terrace ...	21	5	..	3	2	1	..	21	1
Nelson „ ...	9	2	1	1	..	1	..	9	1
Mary Ann Street	53	1	3	4	..	..	..	53	..
Adelaide „	46	3	..	1	..	..	..	46	2
Millicent „	49	1	..	3	..	..	..	49	1
Hill's Terrace ...	59	1	..	4	1	..	..	59	1
Union Street ...	77	2	2	3	10	..	..	77	5
Herbert „	21	..	..	1	1	..	..	21	..
Minny „	24	..	..	2	..	..	..	24	1
Stanley „	29	..	..	..	3	..	..	29	1
Sandon Place ...	34	3	..	1	2	..	..	34	1
Canal Bank ...	9	..	..	2	..	..	..	2	9
Bute Esplanade	12	10	..	1	..	..	..	3	..
Cathays Terrace	26	3	1	2	2	1	..	26	4
Russell Street ...	48	..	1	4	4	..	..	48	9
May „	86	4	3	4	2	2	..	84	12
Nelson „ ...	20	2	1	2	..	..	..	20	2
Christina „ ...	57	9	1	5	6	..	..	57	10
Godfrey „ ...	27	4	2	2	2	..	..	27	11
Flora „	39	5	..	..	2	..	..	39	1
Davis „	30	1	..	6	2	..	..	30	1
Rodney „	18	1	..	..	..	..	..	18	1
Tyndall „	51	4	3	4	3	..	..	46	2
Sandon „	43	15	..	2	..	6	..	43	2
TOTAL ...	1040	95	20	64	62	13	1	1017	96

Table 16. HOUSE INSPECTION.

ROATH DISTRICT, 1888

Name of Street.	Number of Houses Inspected.	Defective Drains.	Choked Drains.	W. C. Pans and Syphons Defective.	Defective Stench Traps permitting an escape of sewer gas.	Saucery Sinks connected direct with Drain.	Inside Closets not ventilated.	Closets not supplied with Water.	Other Nuisances.
Theodore Street	36	...	2	3	1	...	...	36	3
Cecil "	52	1	...	...	3	...	...	52	1
Helen "	58	2	3	1	...	...	...	58	4
Janet "	69	...	1	...	4	...	...	69	4
Daniel "	39	1	1	...	3	...	...	39	3
Lucas "	6	...	...	...	...	...	...	6	2
Robert "	12	2	...	1	...	...	...	12	...
Inverness Place	48	...	1	...	...	...	...	48	3
Donald Street ...	48	...	...	2	...	...	...	48	...
Mackintosh Place	48	...	...	...	2	...	...	48	1
Bertram Street...	60	1	2	...	1	...	...	60	5
Cumrea "	28	...	...	1	1	...	...	28	...
Planet "	55	...	2	...	3	...	...	55	2
Platinum "	17	...	1	...	...	...	...	17	...
Sanquhar "	45	...	...	2	...	...	...	45	4
Kingarth "	32	...	...	...	2	...	...	32	2
Rose "	43	2	1	...	...	...	...	43	1
Gwendoline, "	22	...	...	...	...	...	...	22	4
Kerrycroy "	27	...	...	...	...	...	...	27	4
Lady Margaret St	24	...	2	...	...	...	...	24	1
Broadway ...	100	1	3	...	2	...	...	100	10
Ruby Street ...	56	...	...	3	...	...	...	56	5
Emerald "	56	...	3	...	2	...	...	56	6
Ordell "	72	...	3	...	2	...	...	72	5
Seymour "	14	...	2	...	...	...	...	14	3
Carlisle "	81	...	4	2	...	...	...	81	7
Cumnoch Street	24	...	...	...	...	...	...	24	2
Silver "	25	1	...	...	...	...	...	25	3
Pearl "	102	...	4	...	3	...	...	102	9
Cycle "	20	...	...	2	...	...	...	20	3
John "	52	2	...	3	...	...	...	52	21
Milton "	62	5	4	6	5	...	...	62	11
Total ...	1333	18	39	26	34	...	...	1333	129

Table 16. HOUSE INSPECTION.
CANTON DISTRICT, 1888.

Name of Street.	Number of Houses Inspected.	Defective Drains.	Choked Drains.	W. C. Pans and Syphons Defective.	Defective Stench Traps permitting an escape of Sewer Gas.	Scully Sinks connected direct with Drain.	Inside Closets not ventilated.	Closets not supplied with Water.	Other Nuisances.
Newport Street...	26	...	1	1	2	...	...	26	4
Kingston Court...	10	5	...	...	...	...	...	5	2
Bradford Street	26	...	...	...	2	...	...	26	2
Bromfield "	26	...	...	...	2	...	...	26	2
Bromsgrove "	32	...	...	...	1	...	...	32	6
Earl "	22	1	...	...	2	1	...	22	2
Amherst "	45	...	...	2	3	3	...	45	3
Carpenter Arms Court ...	7	1	...	...	1	...	...	7	3
Kent Street ...	67	...	1	...	1	...	...	67	10
Seven Oak Street	38	1	1	1	1	...	...	38	6
Edward "	73	4	...	1	2	...	...	73	4
Scott "	57	1	1	7	2	...	...	57	7
Gough "	49	1	...	2	1	...	...	49	7
Eisteddfod "	40	4	1	4	7	1	...	40	7
Herbert "	10	2	...	2	1	...	...	10	...
Landore Court ..	20	...	2	3	...	...	...	20	7
Jones "	8	...	4	...	...	...	...	4	...
Glynne Street ...	57	...	1	2	...	...	...	57	9
Springfield Place	27	...	...	1	...	...	...	27	3
North Street ...	6	...	...	1	2	...	...	6	1
Gladstone Cres.	16	...	2	...	...	...	...	16	...
Havelock Street	45	1	3	2	2	...	...	45	5
Havelock "	...	...	...	...	...	...	...	...	...
Grange ...	25	1	1	2	2	...	...	25	5
Lucknow Street	11	...	...	2	1	...	...	11	4
Thomas "	44	3	2	1	5	...	...	44	10
Halket "	52	...	1	...	4	...	...	52	16
East "	16	1	1	...	2	...	...	16	1
Ludlow "	24	...	...	...	4	...	...	24	1
Union Buildings	21	1	6	4	...	...	...	21	4
Total ...	900	27	28	38	50	5	...	891	131

A special inspection has also been made of all the Courts in the Borough, which resulted in the discovery of many sanitary defects; undoubtedly the demolition of many of these places would be advantageous to the public health, but grave difficulties stand in the way of this proceeding. Nevertheless during the year two of the worst courts in the town, namely Daltons' and Gainor's Courts, have been removed in order to make room for extensive business premises. The chief and perhaps the most dangerous defect in connection with these courts is the closet accommodation: and during the early part of the year I called the attention of the Health Committee to the subject in the following report:—

“From overcrowding, want of proper ventilation, insufficient and imperfect closet accommodation, and other sanitary defects, these courts are at all times liable to become so many centres from which zymotic disease may spread all over the town. Previous reports of your Medical Officer of Health have shown them to be fever dens, and to have been the chief spots attacked during the prevalence of epidemics. The nuisance caused by the state of the water-closets seems to be the most dangerous one in connection with these places.

“These closets, 176 in number, are all in a more or less filthy condition owing to faulty construction, deficient water supply, and neglect of the occupiers, who belong chiefly to a class who do not sufficiently appreciate the value of cleanliness. This nuisance is one which is found to exist to a great extent in the courts of all large towns, and various methods of dealing with the difficulty have been adopted. The plan to which I would now direct your attention is that which has been successfully carried out in the courts of Liverpool, where what are called trough closets have been erected, which are stated to possess many advantages, and to be admirably adapted to the wants of a poor population.

“This form of closet is of extremely simple construction composed of glazed earthenware, and is so strong as to be practically unbreakable, the only part at all delicate is the flush tank, which should be under the care of an official of the sanitary authority.

“It is the only form of closet suitable for the inhabitants of courts and alleys, every other description being entirely unsuited for use by careless and ignorant persons, such as are found in the poorer neighbourhoods of large towns.

“Dr. Parkes in a report on the sanitary condition of Liverpool, states that ‘As an apparatus for the speedy and safe

discharge of large quantities of excreta into a drain, we regard the trough closet as superior to any other with which we are acquainted. So long as the trough is full of water, the solid matters which fall into it are completely covered, and are flooded away into the sewer at the moment that the trough is discharged. They are not easily deranged, and can be worked at a comparatively small cost, for all which reasons they are better adapted for the use of people inhabiting courts and alleys than any other form of water-closet.'

"Again Dr. Buchanan, Chief Medical Officer of the Local Government Board, states that 'Nothing could be more admirable than the working of the Liverpool closets, and nothing more marked than the difference between them and what are called water-closets in the poor neighbourhoods of London and other large towns.'

"Also the Medical Officer of Health for Liverpool informs me 'That trough closets answer admirably, and no others would be workable with the class of people who live in courts.'

"The experience of Liverpool, therefore, deserves attention, as showing that the nuisance from closets can be abated in even the lowest of urban quarters, on condition that a proper system of trough water-closets is managed by an efficient Local Authority. An additional advantage possessed by these closets is, that in the presence of an epidemic of cholera or typhoid fever, disinfectants can be easily placed in the trough, and the dangerous properties of the excreta destroyed before they enter the sewers. I should add that I have seen most excellent examples of these water-closets in operation on the premises of the Board Schools in Cardiff, and that they compare most favourably with those in use at some of the other large Schools in the district.

"For the above reasons I strongly advise that the objectionable closets now in use in the courts of this town be replaced, where possible, by some form of trough water-closet, and believe by so doing a vast improvement in the sanitary condition of these places would be effected, and the hygienic defences of your town strengthened against the invasion of such diseases as cholera and typhoid fever."

The following is a list of the courts, together with the number of houses, inhabitants, and water-closets in each court:—

Name of Court.	No. of Houses.	No. of Inhabitants.	No. of Closets.
Landore ...	20	90	21
Dalton ...	9	27	2
Kingston ...	10	30	5
Gainor's ...	5	17	2
Mill Lane (Hayes) ...	6	17	6
Evans' ...	3	16	1
Rowe Square ...	25	121	14
Union Buildings ...	19	86	16
Carpenters' Arms	7	35	5
Temperance Terrace ..	4	16	1
Thomas Terrace ...	6	29	6
Queen's Place ..	4	9	1
Mason's Arms ...	10	39	2
Crown ...	7	15	3
Rowland's Buildings ...	5	15	3
Jones' ...	8	32	4
Harris' ...	6	22	2
Williams ...	6	25	3
Green Gardens ..	6	26	1
Kettle's ..	4	17	4
Garth (Hill Street)	7	23	4
Williams' ...	4	14	2
Davies' ...	3	8	3
Giles' ...	4	25	4
Roberts' ..	7	27	7
Dews' (1) ...	3	11	3
Dew's (2) ...	4	17	2
Peters' ...	2	6	1
Galliver's (Millicent St.)	2	8	1
Evans' ..	2	10	1
Jenkins ...	5	11	5
Jonathan ...	2	8	1
Matthews' ...	6	16	3
Castle ...	7	23	2
Spring Gardens ...	5	28	4
John Street ...	20	78	7
Canal Bank ...	9	43	2
Allen's Arch ...	4	16	2
Loudoun Lane	2	6	2
Thomas' (Ellen Street)	3	9	3
French Cottages ..	4	16	2
Love Lane ...	5	15	2
Lewis' Buildings ...	9	28	9
Stacey's... ..	4	12	2
Total ...	293	1142	176

In consequence of this report the Committee recommended that steps should be taken to remove the defective closets, and to construct suitable trough closets in those courts in which they could be conveniently placed. This improvement has already been effected in four instances; the closets are found to work admirably, and to be in every way adapted for the purpose.

New Houses.—The ample accommodation which is provided by the yearly increase in the number of new houses meets the requirements of the district, so that overcrowding does not exist to any great extent; moreover, the inspections which are continually made by your inspectors have the effect of checking this evil. The yearly increase of houses is shewn by the following returns obtained from Mr. Harpur, C.E., your Surveyor.

Number of houses and shops built in the Borough during the last seven years:—

From August, 1881, to August, 1882	...	...	686
" " 1882, " " 1883	...	...	980
" " 1883, " " 1884	...	...	1445
" " 1884, " " 1885	...	...	1345
" " 1885, " " 1886	...	...	1201
" " 1886, " " 1887	...	...	1226
" " 1887, " " 1888	...	...	1062
Total	...	...	7945

At the request of the Health Committee and in conformity with the order of the Local Government Board, I have advised on certain points connected with the construction of new building bye laws, and have suggested the adoption with certain modifications of the model code published under the authority of the Local Government Board. These regulations contain many valuable provisions relating to the sanitary condition of new buildings.

The powers which, in the interest of the public, it is most desirable that the Sanitary Authority should be able to exercise, are chiefly those which deal with matters affecting the construction, ventilation, and drainage of buildings, and which provide suitable regulations with regard to building on damp and unwholesome soil. The injurious effects of this latter evil are now recognised by sanitarians, and it is well understood that one of the most frequent sources of impurity in the air of dwellings, is the damp and polluted condition of the ground beneath and adjacent to them. The ground air which arises becomes injurious to health from being impregnated with

carbonic acid and organic gases, depending in quantity upon the amount of putrescible animal and vegetable substances existing in the soil. In order to secure the best hygienic conditions in dwellings, every care should be taken to prevent dampness rising up the walls of houses through the foundations. This is usually accomplished by building on a foundation of concrete, and by the insertion of a "damp course" in the external walls. The adoption of these model bye-laws will enable the Sanitary Authority to enforce these and other provisions relating to the sanitation of dwellings, and their proper enforcement will doubtlessly lead to the diminution of those forms of disease known to be associated with unhealthy homes. The mortality statistics relating to those towns in which habitations are built on undrained water logged land on the banks of rivers, show that the death-rate from lung diseases and from zymotic and diarrhoeal diseases is increased in proportion as wetness prevails.

Common Lodging Houses—These houses are registered and regulated in accordance with the provisions of the Public Health Act. Regulations are also contained in a Local Act of Parliament. These provide—

- 1.—For fixing the number of lodgers, who may be received into a common lodging house.
- 2.—For promoting cleanliness and ventilation in such houses.
- 3.—For giving notices and taking precautions in the case of infectious diseases, and
- 4.—Generally for the well ordering of such houses.

The day and night inspections made by your Inspectors of Nuisances have prevented, to a great extent, overcrowding or other nuisances from taking place in these houses. There are at present fifteen registered common lodging houses in the Borough, affording accommodation for 275 persons. The amount of cubic space allowed for each person being 400 ft., this amount, although far too small, is as much as it is possible to enforce.

Disinfection.—During the year, 700 infected articles, clothing, bedding, &c., were disinfected; 95 rooms and 39 schools were disinfected with sulphurous acid or chlorine gas by your officials. At present, dry heat is used in the disinfecting chamber, and articles are exposed for some hours to a temperature of 250°F. Dry heat, however, penetrates very slowly into bulky and badly conducting articles, such as bedding and clothing, and it has been found that these articles are much more effectually disinfected by steam under pressure,

the pressure being relaxed from time to time, so as to displace the cold air in the material. This method is now adopted with success in many places.

Some experiments have recently been made by Dr. Parsons, Medical Inspector of the Local Government Board, with a view of ascertaining the best methods of disinfecting by heat. It was found that with the exception of the spore bearing cultivations of the bacillus of anthrax, all the infective materials experimented on were destroyed by an exposure of an hour to dry heat of 220° F. or one of five minutes to steam of 212° F. Spores of the bacillus of anthrax required for destruction four hours' exposure to dry heat of 220° F., or one hour's exposure to dry heat of 245° F., but were destroyed by five minutes' exposure to a heat of 212° F. in steam. In the apparatus for disinfection by steam, the temperature of the interior is uniformly distributed, and is capable of being maintained constant for the time during which the operation extends. The articles are rapidly and efficiently disinfected. For these reasons, steam chambers are preferable to those in which dry heat is employed. The apparatus which gives the best result is that known as Lyons' patent steam disinfecter manufactured by Messrs. Manlove Alliot & Co., Nottingham.

Food Supply and Slaughter Houses.—The public abattoirs were systematically inspected. On several occasions my attention was called to diseased or unsound meat in the meat markets adjoining the slaughter houses. The 116th sec. of the Public Health Act, requires the Medical Officer of Health to inspect in any case in which it may appear to him necessary, any animal, carcase, meat, poultry, game, fish, or other article of food exposed for sale and intended for the food of man, which is deemed to be diseased or unsound or unwholesome or unfit for food of man, and if he find that such animal or article is unfit for food, he shall give such directions as may be necessary for causing the same to be seized, taken, and carried away in order to be dealt with by a justice. Under the power given by the above section, the following articles were seized and condemned as unfit for food and destroyed by order of the magistrates:—

Hams	..	...	...	...	1150lbs.
Bacon	...	...	...	...	460 „
Pork...	...	...	...	...	469 „
Beef ...	..	...	...	...	957 „
Veal ...	...	..	...	...	17 „
Fish ...	...	...	...	...	4479 „
Total ...					<hr/> 7532lbs.

In September last, new bye-laws relating to the management of the slaughter houses of the Corporation were approved and came into force.

Offensive Trades.—The 112-114th sections of the Public Health Act give power to Urban Sanitary Authorities to restrict the establishment of offensive trades in their district, such as bone boiling, soap boiling, tallow melting, blood boiling, &c.

With proper precautions, and by taking advantage of modern appliances, many of these trades may be carried on without causing serious nuisance to the neighbourhood. During the year, several complaints have been received as to nuisances arising from carrying on these trades in an improper manner, especially those of tallow melters. In each instance, the nuisance was abated by the construction of improved apparatus, by which the escape of offensive vapours was prevented.

Scavenging Operations.—The following information has been supplied to me by Mr. Woosey, who has charge of the scavenging staff and under whose superintendence the work has been well performed ;—

The main thoroughfares are cleared every day, commencing at 7 a.m.

Shop refuse is cleared from 8.30 a.m. to 9.30 a.m. every morning.

All main thoroughfares cleared by 11.0 a.m.

Household refuse is cleared three nights weekly, commencing at 11.0 p.m. to 6.0 a.m. on Monday, Wednesday, and Friday nights. All householders are requested to place refuse in a suitable receptacle in the channel in front of the house they occupy. 20 horses and waggons are required three nights weekly to attend to this work.

80 waggon loads is the average each night from 11.0 p.m. to 6.0 a.m.

Back lanes are cleared three days weekly from 11.0 a.m. to 1 p.m. Waggon go around with bells, when the occupier places the ash receptacle inside the yard or garden door ready for men to remove it.

All ashes are taken to a central depôt, and afterwards to the tip—a large tract of common land which is being raised 4 feet above tide level.

Bakehouses.—The Factory and Workshops Act of 1883 transfers the supervision of bakehouses from the factory inspectors to sanitary authorities, and confers upon the medical officer of health the powers of entry, inspection, and taking legal proceedings, formerly held by the Inspectors under the Factory Act. Under the powers given by this Act, 166 bakehouses were inspected during the year, and several notices served to remedy sanitary defects. The attention of bakers has been called to the necessity of maintaining their premises in a good sanitary condition. Regulations have been framed in accordance with the provisions of the Acts, copies of which have been supplied to each bakehouse proprietor in the district.

Sale of Food and Drugs Act.—Articles of food and drugs analysed by Mr. Hughes, F.I.C., F.C.S., the Borough Analyst, under the provisions of the Sale of Food and Drugs Act, during the year 1888:—

Samples obtained for analyst.	No.	Genuine.	Adulterated.
Milk	107	100	7
Whiskey	12	12	0
Gin	18	17	1
Coffee	17	17	0
Lemonade	5	5	0
Soda Water	1	1	0
Tea	6	6	0
Pepper	12	12	0
Butter	24	24	0
Total	202	194	8

Magisterial Proceedings.—Legal proceedings were taken in the following cases:—

Slaughtering in unlicensed premises ...	2
Deposit of manure in streets	2
Deposit of refuse in streets	5
Sanitary defect on premises	1
Keeping cows in unregistered shed ...	2
Total	12

Summary of work performed by the Inspectors of Nuisances during the year 1888:—

Nuisances inspected	...	...	...	...	1690
Notices issued	...	...	...	...	1650
Nuisances abated without legal proceedings	...	...	...	...	1636
" " with legal proceedings	...	...	...	...	12
Animals kept so as to be a nuisance	...	...	...	...	23
Injurious and foul accumulations...	...	...	...	...	321
Nuisances from smoke	...	...	...	...	2
Suspected samples of water obtained for analysis	...	...	...	...	7
Cesspools cleansed	...	...	...	...	8
" abolished	...	...	...	...	1
Drains unstopped and cleansed	...	...	...	...	392
" trapped and repaired	...	...	...	...	345
Foul and offensive closets cleansed	...	...	...	...	201
Defective apparatus to water closets repaired	...	...	...	...	26
Water laid on to water closets	...	...	...	...	9
Dilapidated and dirty houses cleansed and repaired	...	...	...	...	100
Articles destroyed as unfit for human food	} meats			lbs.	3053
				"	4479
Number of houses inspected	...	...	...	...	11264
" day inspections of lodging houses	...	...	...	...	420
" night inspections of lodging houses	...	...	...	...	350
" cases of overcrowding	...	...	...	...	1
" houses disinfected	...	...	...	...	95
" schools	...	...	...	...	39
" articles	...	...	...	...	70
" " destroyed	...	...	...	...	38
" inspection of dairies, cowsheds, and milkshops	...	...	...	...	285
" " bakehouses	...	...	...	...	166
Other matters not included above...	...	...	...	...	245

In conclusion I desire to express my satisfaction with the efficient manner in which your Chief Inspector Mr. Vaughan, and Inspectors Leyshon, Hellerman, and Lightfoot, have discharged their several duties.

I have the honour to be, Gentlemen,

Your obedient Servant,

EDWARD WALFORD, M.D.,

Medical Officer of Health.

APPENDIX.

Meteorology.—This table gives the mean temperature of the four quarters of the year 1888 in Cardiff, as compared with the average of five previous years, and the mean temperature of the air at Greenwich:—

CARDIFF.			GREENWICH.
1888.	Mean.	Diff. from average of 5 years.	Mean.
1st Quarter ...	38°·3	— 2°·2	36°·9
2nd Quarter ..	51°·3	— 1°·1	51°·6
3rd Quarter ...	57°·6	— 1°·8	57°·6
4th Quarter ...	46°·1	+ 2°·5	44°·6

Mean temperature of each month in the year, as compared with that of the previous five years :—

	1883.	1884.	1885.	1886.	1887.	Mean of 5 years.	1888.
January...	40°·5	44°·5	38°·5	37°·5	37°·5	39°·7	38°·4
February..	42°·2	42°·0	44°·1	35°·6	40°·1	40°·8	36°·7
March ...	37°·5	45°·7	42°·1	40°·7	39°·1	41°·0	39°·8
April ...	48°·1	45°·4	46°·3	48°·4	44°·6	46°·5	44°·6
May ...	52°·5	52°·7	49°·9	53°·1	50°·9	51°·8	52°·4
June ...	57°·4	58°·6	59°·2	58°·8	61°·0	59°·0	56°·9
July	58°·4	59°·8	63°·1	63°·0	64°·6	61°·7	58°·1
August ...	60°·0	63°·1	59°·1	62°·9	60°·2	61°·0	58°·9
September	56°·9	59°·8	51°·3	57°·6	51°·7	55°·4	55°·8
October ..	50°·1	49°·4	45°·4	52°·3	43°·2	48°·0	48°·6
November	43°·8	43°·8	44°·0	45°·0	39°·4	43°·2	47°·5
December	41°·2	41°·7	38°·8	37°·7	38°·2	39°·5	42°·2

The following is a monthly summary of the meteorological observations during the year :—

MONTHS.	BAROMETER.			THERMOMETER.						HYGROMETER.		Total Rainfall.	Death-rate per 1000 persons living.	
	Highest.	Lowest.	Mean of Month.	Maximum.	Minimum.	Mean of		No. of days at or below 32 deg.	Mean of Dry Bulb.	Mean of Wet Bulb.	Inches.		All causes.	7 chief zymotic diseases.
						Max.	Min.							
January	9-10 30-650	2 29-280	30-237	23 52-5	30 23-2	42-6	34-2	38-4	15	38-4	38-2	1-70	22-6	1-4
February	24 30-530	12 29-580	30-071	7 61-1	25 22-2	40-9	32-5	36-7	19	36-9	36-6	1-07	18-2	1-2
March	21 30-320	26 29-100	29-662	9 55-0	2 24-8	45-3	34-3	39-8	13	39-9	38-3	4-62	22-7	1-4
April	6 30-300	19 29-600	29-921	15 57-0	9 30-0	50-3	38-9	44-6	3	45-3	42-0	1-48	21-2	1-3
May	21 30-430	1 29-330	30-051	23 70-8	15 37-8	60-1	44-8	52-4	0	52-6	49-5	1-69	17-2	1-3
June	19 30-240	29 29-620	29-956	25 78-0	18 44-0	63-8	50-1	56-9	0	51-3	53-9	3-69	15-9	2-3
July	13 30-160	16 29-470	29-797	17 69-2	11 42-0	64-0	52-3	58-1	0	59-5	56-5	6-83	14-6	1-7
August	18 30-300	25 29-720	30-025	8 74-8	16 56-5	65-7	52-2	58-9	0	60-6	57-4	3-50	16-6	1-5
September.	13 30-450	29 29-830	30-180	15 70-0	25 41-2	63-2	48-5	55-8	0	56-5	53-9	1-21	18-7	4-4
October	22 30-440	13 29-180	30-061	27 63-5	33-0	55-2	42-0	48-6	0	49-1	46-9	1-74	21-6	4-4
November.	23 30-250	27 29-230	29-800	57-5	8 36-0	51-1	43-9	47-5	0	48-3	47-1	7-04	26-6	7-4
December	16 30-500	22 29-050	30-295	4 & 5 55-5	17 27-8	46-9	37-6	42-2	9	42-7	41-8	3-61	29-4	7-4

The following table shows the monthly rainfall, the greatest fall in 24 hours, with date and the number of days on which 0·01 in. or more rain fell :—

Month.	Total depth.	Greatest fall in 24 hours.	Date.	Days on which 0·01 or more rain fell.
	Inches.	Inches.		
January	1·70	0·49	1st	12
February	1·07	1·09	2nd	9
March	4·62	0·76	24th	15
April	1·48	0·30	17th	13
May	1·69	0·40	17 & 29	8
June	3·69	0·74	21st	17
July	6·83	1·16	7th	25
August	3·50	1·02	29th	17
September	1·21	0·52	27th	8
October	1·74	0·52	28th	11
November	7·04	1·13	12th	26
December	3·61	0·88	27th	16
	38·18			177

The following is the rainfall for the year 1888, as compared with six previous years :—

Month.	1882.	1883.	1884.	1885.	1886.	1887.	Mean of Month	1888.
January	3·19	5·75	6·03	3·71	5·03	2·76	4·4	1·70
February	2·56	3·73	4·40	3·65	1·32	1·45	2·85	1·07
March	2·26	0·60	3·39	1·87	3·97	3·21	2·55	4·62
April	5·68	0·67	1·56	2·52	2·98	1·63	2·50	1·48
May	2·72	1·90	2·37	3·86	6·38	1·94	3·19	1·69
June	4·28	1·81	1·92	2·61	0·70	0·60	1·98	3·69
July	5·77	3·56	4·05	0·72	4·85	1·51	3·4	6·83
August	6·75	2·09	2·21	2·74	1·68	2·8	3·05	3·50
September	3·94	6·14	1·96	6·51	3·8	4·07	4·28	1·21
October	8·33	4·23	1·01	5·59	5·09	2·80	4·50	1·74
November	6·26	6·38	2·12	5·47	5·39	3·48	4·85	7·04
December	4·86	1·92	5·87	1·74	6·64	3·46	4·08	3·61

The following table illustrates the daily directions of winds throughout the year :—

Direction of Winds.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
N.W.	2	6	4	6	2	4	5	7	2	2	4	2	46
S.W.	2	4	2	1	3	4	1	9	5	9	9	10	59
N.E.	11	9	6	11	6	12	5	6	18	12	7	13	116
N.	2	2	3	2	1	1	3	...	...	3	1	...	18
N.N.E.	...	...	...	...	...	1	/	...	3	...	1	...	5
S.S.W.	...	...	...	...	1	...	2	1	...	...	2	...	3
W.N.W.	...	...	...	...	1	...	4	1	...	1	...	...	5
W.	3	3	7	1	3	1	4	1	1	3	...	...	27
E.	5	5	4	3	1	...	1	1	...	1	...	...	21
S.E.	6	...	2	2	7	3	2	2	1	...	5	6	36
S.	...	...	3	4	6	4	8	4	...	...	1	...	30

The following table shows the distribution of mortality from the seven chief zymotic diseases in each street in the sub-districts :—

CARDIFF (NORTH).

Streets.	Small Pox.	Measles.	Scarlatina.	Diphtheria.	W. Cough.	Fever.	Diar- rhoea.	Total.
Bedford	2	...	...	...	...	2
Coburn	...	1	...	...	...	...	...	1
Cairn	...	3	...	...	2	...	2	7
Catherine	1	1
Cross	1	1
Cathays Terrace	3	3
Dalton	...	1	...	...	...	...	...	1
Fitzroy	1	...	...	...	1
Flora	2	1	...	...	...	3
Fanny	1	...	...	1
Gipsy's Van	1	...	1
George	1	1
Gordon Road	1	1
Harriet Place	...	1	...	...	...	...	...	1
May	...	1	3	...	...	...	...	4
Merthyr	1	...	...	...	...	1
Miskin	1	1
Mundy Place	1	...	...	1
Newport Road	1	1
Peter	1	...	...	...	1
Queen	1	...	...	1
Richard	1	1
Richmond Road	...	1	...	...	...	...	...	1
The Barracks	...	1	...	...	...	...	...	1
Treorky	...	1	...	...	...	...	...	1
Thesiger	1	...	...	1
Union Workhouse	...	3	...	1	1	2	...	7
Total	...	13	8	4	7	3	12	47

CARDIFF (SOUTH).

Streets.	Small-Pox.	Measles.	Scarlatina.	Diphtheria.	W Cough.	Fever.	Diar-rhea.	Total.
Adam	2	2
Augusta	1	..	..	..	..	1
Adelaide	1	1
Baker's Row	1	..	..	..	1
Buzzard	1	..	..	..	..	1
Beauchamp	1	..	..	1
Bute	1	..	1
Cathedral Road	1	1
Canal Wharf	1	1
Cowbridge Road	1	..	..	..	..	1
Crichton	1	..	..	..	..	1
Clare Gardens	1	..	1
Castle	1	..	1
Charles	1	1
Davis	1	..	..	..	..	1
David	1	..	1	2
De Burgh	1	1
Dudley Terrace	1	..	..	..	..	1
Dudley	1	..	..	1
Duffryn	1	..	..	..	1
East	1	..	..	..	..	1
Eisteddfod	1	..	..	..	2	3
Ellen	2	2
Frederick	1	1
Fitzhamon Embankment	1	..	..	..	..	1
Frederica	1	..	..	1	2
Gough	1	..	..	..	..	1
George	2	..	..	2
Godfrey	1	..	..	..	1
Green	1	..	1
Hill's Terrace	1	..	..	..	2	3
Hospital Ship	..	4	..	..	..	1	1	6
Herbert	1	..	..	..	..	1
Havelock	1	..	..	1	2
Louisa	3	..	..	..	3
Moirs Terrace	1	..	..	..	..	1
Millicent	1	..	..	1	2
Moirs	1	..	..	..	1
North Church	1	..	1
Carried forward	...	4	12	11	...	5	6	57

CARDIFF (SOUTH).—Continued.

Streets.		Small- Pox.	Measles.	Scar- latina.	Diph- theria.	W. Cough.	Fever.	Diar- rhoea.	Total.
Brought forward	...	4	12	11	..	5	6	19	57
Patrick	...	...	..	...	1	1	1	...	3
Peel	..	...	...	...	...	1	1	...	2
Quay	...	..	1	...	...	..	...	...	1
Queen	...	...	..	1	..	...	...	...	1
Rodney	...	...	...	...	...	...	..	1	1
Station Terrace	...	...	1	..	...	...	...	...	1
Sophia	...	...	1	...	...	...	...	...	1
South Luton Place	...	...	...	...	...	..	1	...	1
Scott	...	...	...	3	...	...	...	...	3
St. Mary	...	...	...	...	...	1	1	..	2
South William	...	...	...	...	...	...	1	...	1
The Hayes	...	...	...	...	...	...	...	1	1
Tredegar	...	...	...	...	...	...	...	1	1
Union	...	...	1	...	..	1	...	...	2
West Church	...	...	...	...	...	...	...	1	1
Womanby	...	...	1	...	...	1	...	...	2
Total	...	4	17	15	1	10	11	23	81

ROATH (NORTH).

Streets.	Small. Pox.	Measles.	Scar- latina.	Diph- theria.	W. Cough.	Fever.	Diar- rhoea.	Total.
Alexander	1	..	...	...	1	2
Arabella	1	...	1
Crwys Road	1	1
Cyfarthfa	1	1	..	...	...	2
Clive	...	1	...	...	...	...	...	1
Donald	1	...	...	1
Elm	1	...	1
Inverness Place	...	1	...	...	...	...	...	1
*Mackintosh "	...	1	...	..	...	...	...	1
Milton	1	...	...	...	1	2
Newport Road	1	1
Oxford	1	...	...	...	...	1
Rose	2	2
Shakespeare	2	...	...	...	...	2
Treharris	2	...	2
*Lily	...	2	...	...	..	...	...	2
Total	...	5	6	1	1	4	6	23

ROATH (SOUTH).

Streets.	Small-Pox.	Measles.	Scarlatina.	Diphtheria.	W. Cough.	Fever.	Diar-rhea.	Total.
Adamsdown	...	1	...	...	...	...	..	1
Adeline	1	1
Broadway	...	1	...	...	2	...	2	5
Burnaby	...	2	...	...	...	...	...	2
Clifton	...	1	...	...	..	1	...	2
Constellation	...	1	..	...	1	...	...	2
Cecil	2	1	1	4
Carlisle	...	1	..	...	...	..	1	2
Emerald	1	1
Fort	1	1
Harbershon	...	2	...	...	...	..	...	2
Helen	...	1	..	...	...	...	...	1
Howard	1	1
Iron	...	1	1	...	...	...	...	2
Infirmiry	4	...	4
John	1	...	1	2
Maud	1	1
Marion	1	...	..	1
Metal	1	...	...	1
Meteor	...	1	...	...	...	...	...	1
Ordell	...	1	...	...	...	...	...	1
Planet	...	1	...	...	...	...	...	1
Prince Leopold	1	...	...	..	...	1
Pearl	...	3	...	...	3	...	1	7
Railway	2	2
Ruby	...	1	...	...	...	...	...	1
Sanguhar	1	...	...	1
Splot Road	1	...	...	1
System	1	1
Sun	1	...	...	1
Stacey Road	1	...	...	1
Topaz	1	...	...	1
Theodore	...	2	...	...	...	...	...	2
Walker's Road	1	1
Zinc	...	1	...	...	...	...	...	1
Total	...	21	2	...	16	6	15	60

CANTON (NORTH).

Streets.	Small-Pox.	Measles.	Scarlatina.	Diphtheria.	W. Cough.	Fever.	Diar-rhea.	Total.
Carmarthen	...	1	...	...	...	...	1	2
Clive Road	1	1	2
Cowbridge Road	...	1	...	...	...	...	...	1
Cardigan	...	1	...	...	...	...	...	1
Daisy	...	1	...	...	1	...	...	2
Egerton	1	...	...	1
Ethel	1	...	...	1
Glynne	...	1	...	...	...	...	2	3
Glamorgan	...	1	...	...	1	...	1	3
Halket	1	1
King's Road	2	...	1	3
Llandaff "	2	...	...	2
Market "	1	...	...	1
Pembroke "	...	2	...	...	...	...	1	3
Penypeell	...	1	...	...	...	...	...	1
Radnor Road	...	1	...	...	...	...	...	1
Severn "	...	1	...	...	...	...	2	3
Springfield Place	...	1	...	...	...	...	...	1
Union	...	1	...	...	...	...	...	1
Wyndham Road	1	...	1	2
Wyndham Crescent	...	1	...	...	...	...	...	1
Total	...	14	...	...	10	1	11	36

CANTON (SOUTH).

Streets.	Small-Pox.	Measles.	Scarlatina.	Diphtheria.	W. Cough.	Fever.	Diar-rhea.	Total.
Alexander	1	...	...	1	2
Atlas Terrace	...	1	...	...	...	...	...	1
Cowbridge Road	...	1	...	...	...	...	...	1
Craddock	...	2	...	...	...	...	...	2
*Chancery Lane	...	2	...	...	...	...	...	2
De Burgh	1	1	...	2
Eldon	...	2	...	...	...	1	1	4
Edward	2	...	...	2
Leckwith Road	...	1	...	...	1	...	...	2
Lewis	...	1	...	...	...	...	...	1
Carried forward	...	10	...	1	4	2	2	19

CANTON (SOUTH).—Continued.

Streets.	Small-Pox.	Measles.	Scarlatina.	Diphtheria.	W. Cough.	Fever.	Diarhoea.	Total.
Brough, forward	10	...	1	4	2	2	19
Mandeville	1	1
Machen Place	1	...	...	1
Picton Place	1	...	...	1
Roll	1	...	1	2
Kennie	3	...	...	...	...	...	3
South Morgan	2	...	...	1	...	...	3
Smeaton	1	1
Wells	1	...	...	...	...	...	1
Wellington	2	...	...	...	...	...	2
*Coke	1	...	...	1
Total	18	...	1	9	2	5	35

GRANGETOWN.

Streets.	Small-Pox.	Measles.	Scarlatina.	Diphtheria.	W. Cough.	Fever.	Diarhoea.	Total.
Allerton	1	1
Bromfield	2	...	2
Bradford	3	...	...	...	...	...	3
Clive	1	...	...	...	2	2	5
Court Road	1	...	...	...	...	...	1
Cornwall	1	...	1
Earl	1	...	...	...	...	1	2
Fair View	1	1
Hewell	1	1	...	...	1	...	3
Holmesdale	2	...	...	...	1	3	6
Havelock	1	...	...	...	...	...	1
Hereford	1	1
Kent	1	...	...	1
Knole	1	...	...	...	...	...	1
Ludlow	2	...	...	...	...	...	2
Machen	1	...	...	...	1
Newport	2	...	...	...	...	...	2
Oakley	2	...	...	...	...	1	3
*Tynant	1	...	...	...	...	...	1
*Penarth Road	2	...	...	...	2	...	4
Total	20	1	1	1	9	10	42

CARDIFF URBAN SANITARY AUTHORITY.

Deaths Registered at Ages from the several Causes during the
Year 1888.

CAUSES OF DEATH.	DEATHS AT AGES.							TOTAL.	As per Registrar General's Estimate 108,570.	As per Registrar General's probable Estimate, 122,141.
	Under 1 Year.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 50.	50 and under 80.	80 and upwards.			
CLASSES.										
I. Zymotic Diseases...	138	161	31	17	30	10	1	358	3-373	3-176
II. Constitutional ...	44	38	16	53	177	25	6	359	3-306	2-939
III. Local ...	227	103	31	57	361	205	23	1007	9-275	8-244
IV. Developmental ...	196	21	2	4	12	53	32	330	2-974	2-619
V. Violent Deaths. ...	8	13	12	19	42	14		108	0-994	0-884
Sudden Deaths, cause unascertained	7	3	1	1	14	4		30	0-276	0-246
Total ...	620	339	93	151	636	311	62	2212	20-373	18-110
CLASS I.										
Small Pox ...				2	2			4	0-036	0-032
Measles ...	27	74	7					108	0-994	0-884
Scarlet Fever ...	1	23	8					32	0-294	0-261
Diphtheria ...	1	3	4					8	0-073	0-065
Croup ...	4	16	2					22	0-202	0-180
Whooping Cough ...	22	32						54	0-479	0-442
Enteric Typhoid Fever ...		1	8	12	12	1		34	0-313	0-278
Simple continued Fever ...		2						2	0-018	0-016
Erysipelas ...	2				3	1		6	0-055	0-049
Puerperal Fever (Metritis) ...				2	1			3	0-027	0-024
Dysentery ...	1				2			3	0-027	0-024
Diarrhoea ...	70	6			2	4		82	0-755	0-671
Pyæmia ...				1	2			3	0-027	0-024
Rheumatism ...			2		3	2		9	0-082	0-073
Syphilis ...	8	2						9	0-082	0-073
Stricture of Urethra ...					2		1	3	0-027	0-024
Hydrophobia ...					1			1	0-009	0-008
Went of Breast-Milk ...	1							1	0-009	0-008
Purpura and Scurvy ...	1							1	0-009	0-008
Intemperance ...						2		2	0-018	0-016
Thrush ...		1						1	0-009	0-008
Total ...	138	161	31	17	30	10	1	388	3-373	3-176
CLASS II.										
Dropsy ...	2				2			4	0-036	0-032
Cancer ...				1	27	14	4	46	0-423	0-376
Carcinoma Ovis (Noma) ...	1							1	0-009	0-008
Mortification ...					2	1	1	4	0-036	0-032
Scrofula ...	11	6	2		4	1		24	0-221	0-196
Tuberc Mesenterica ...	6	6			2			14	0-128	0-114
Phthisis ...	6	6	4	48	138	9	1	211	1-943	1-728
Hydrocephalus ...	19	20	10	4	2			55	0-506	0-450
Total ...	44	38	16	53	177	25	6	359	3-306	2-939
CLASS III.										
Cephalitis ...		1			2			3	0-027	0-024
Apoplexy ...			1		18	11		30	0-276	0-245
Paralysis ...	1			1	17	18	5	42	0-386	0-343
Insanity ...					1	1		2	0-018	0-016
Chorea ...				1				1	0-009	0-008
Epilepsy ...		2	1	2	4	1		10	0-092	0-081
Convulsions ...	98	13	6	1	2	2		120	1-105	0-982
Brain Disease, &c. ...	7	1	2	1	16	8	2	37	0-340	0-302
Pericarditis ...					4			4	0-036	0-032
Aneurism ...					1	3		4	0-036	0-032
Heart Disease, &c. ...	3		5	13	76	49	6	152	1-400	1-244
Laryngitis ...	3	4	3	1	3	1		15	0-181	0-122
Bronchitis ...	58	22	1	1	44	63	8	197	1-814	0-612
Pleurisy ...		1	1		8	4		14	0-128	0-114
Pneumonia ...	36	46	5	16	67	18		178	1-639	1-458
Asthma ...					2	1		3	0-027	0-024
Lung disease &c. ...	4	2		1	13	1		21	0-193	0-171
Gastritis ...	2	1		2	1			6	0-055	0-049
Enteritis ...	9	1	1	1	1	1		14	0-128	0-114
Peritonitis ...		3	1	2	5	3		14	0-128	0-114
Ascites ...				1	1			2	0-018	0-016
Ulceration of Intestines ...					2			2	0-018	0-016
Hernia ...					2	1		3	0-027	0-024
Intussusception ...	3				1			4	0-036	0-032
Stricture of Intestines ...		1			1		1	3	0-027	0-024
Fistula ...					1			1	0-009	0-008
Stomach Disease, &c. ...			1		7			9	0-082	0-073
Hepatitis ...				2	3		1	6	0-055	0-049
Jaundice ...	1	1				2		4	0-036	0-032
Liver Disease, &c. ...				1	18	3		22	0-202	0-180
Nephritis ...	1	1			6	1		10	0-092	0-081
Bright's Disease ...	1			3	33	8		45	0-414	0-368
Diabetes ...			1		4			6	0-055	0-049
Calculus (Stone) ...				1	1			1	0-009	0-008
Cystitis ...				1	1	2		4	0-036	0-032
Kidney Disease, &c. ...		1		1	3			5	0-046	0-040
Ovarian Dropsy ...					1	1		2	0-018	0-016
Uterus Disease ...					4			4	0-036	0-032
Synovitis (Arthritis) ...						1		1	0-009	0-008
Joint Disease, &c. ...		1	2	1		1		5	0-046	0-040
Skin Disease &c. ...		1						1		
Total ...	227	103	31	57	361	23	23	1007		
CLASS IV.										
Premature Birth ...	68							68	0-626	0-556
Cyanosis ...	1							1	0-009	0-008
Spin. Bifida ...	3							3	0-027	0-024
Other Malformations...	1		1					2	0-018	0-016
Teething ...	8	7						15	0-181	0-122
Childbirth (see Metrisia) ...				3	7			10	0-092	0-081
Old Age ...				2	49		32	83	0-764	0-679
Atrophy and Debility ...	115	14	1	1	3	4		138	1-271	1-129
Total ...	196	21	2	4	12	53	32	320	2-974	2-619
CLASS V.										
Fractures or Contusions ...			1	7	20	6		34	0-313	0-278
Gunshot Wounds ...					1			1	0-009	0-008
Burns and Scalds ...	1	8	2		2			13	0-119	0-107
Drowning ...	3	3	5	10	14	2		37	0-340	0-302
Suffocation ...	1				1			2	0-018	0-016
Otherwise ...	3	1	3			1		8	0-073	0-065
Murder and Manslaughter ...		1	1	1	2	1		6	0-055	0-049
Cut, Stab ...								2	0-018	0-016
Poison ...				1	2			3	0-009	0-008
Drowning ...						2		2	0-018	0-016
Hangings ...						1		1	0-009	0-008
Otherwise ...						1		1	0-009	0-008
Total ...	8	13	12	19	42	14		108	0-994	0-884
Sudden Deaths (cause unascertained)	3		1		2			6	0-055	0-049
Causes not classified or distributed...	4	3		1	12	4		24	0-221	0-196
Total ...	7	3	1	1	14	4		30	0-276	0-246

LOCAL GOVERNMENT BOARD TABLES.

K² 3.

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TABLE OF DEATHS during the year 1888, in the Division of the Urban Sanitary District of Cardiff; classified according to DISEASES, AGES, LOCALITIES, and showing also the Population of such Localities, and the Births therein during the Year.

Names of Localities adopted for the purpose of these Statistics; public institutions being shown as separate localities.		POPULATION AT ALL AGES.		Registered Births.	MORTALITY FROM ALL CAUSES, AT SUBJOINED AGES.							MORTALITY FROM SUBJOINED CAUSES, DISTINGUISHING DEATHS OF CHILDREN UNDER FIVE YEARS OF AGE.																																																																																																																																																																																																																																																																																																																																																																																																																	
		Census 1881.	Estimated to middle of 1888.		At all ages.	Under 1 year.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 60.	60 and upwards.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Croup (not epidemic).	Whooping Cough.	CONTINUED FEVERS.										Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	Cholera.	Typhus.	Typhoid.	Other.	Diphtheria.	Dysentery.	

E R R A T A .

Title page, for *Epidemological* read *Epidemiological*.

Page 26, line 38, for *westerly* read *easterly*.

Page 27, line 35, for *westerly* read *easterly*.

Page 28, line 6, for 2·78 read 2·03 ; and

„ „ „ 7, for 2·03 read 2·78.

CARDIFF PORT SANITARY AUTHORITY.

TOWN HALL, CARDIFF,

February 11th, 1889.

To the Chairman and Members of the Cardiff Port Sanitary Authority.

GENTLEMEN,

I have the honour to submit to you my Annual Report for the year 1888.

The Regulations made by the Port Sanitary Authority define the boundaries of your District as follows:—

“ The expression ‘ Port of Cardiff ’ means so much of the
 “ Customs Port of Cardiff as lies between the River Rumney
 “ and Lavernock Point, together with the waters of the said
 “ Port within such limits and the place for the time being
 “ appointed as the Customs Boarding Station for such part of
 “ the said Port and every other place for the time being
 “ appointed for the mooring or anchoring of ships for such
 “ part of the said Port under any regulations for the spread of
 “ disease issued under the authority of the statutes in that
 “ behalf, and the Water Sides, Docks, Basins and Creeks of
 “ and belonging to such part of the said Port.”

The Port Sanitary District includes the following docks:—
 Roath Dock, East and West Bute Docks, and Penarth Dock.
 The floating population of the District probably amounts to
 about 7,000 persons.

The following Table shows the number of vessels entering
 the docks during the year 1888 compared with that of previous
 years:—

Year.	No. of Vessels cleared Outwards.		Total No. of Vessels, Foreign and Coastwise.	Tonnage.		Total Tonnage, Foreign & Coastwise Outwards.
	Foreign	Coastwise.		Foreign.	Coastwise.	
1886	5,390	6,742	12,132	4,174,950	931,503	5,106,453
1887	5,925	6,531	12,456	4,714,247	919,898	5,634,145
1888	6,179	7,095	13,274	5,148,068	935,694	6,083,762

All serious cases of illness among seamen are admitted into the Hamadryad Hospital Ship, and all infectious diseases on board ship are accommodated in a wooden building situated within 43 yards of the entrance to this Hospital. This building consists of two wards, containing together 26,000 cubic feet of space. There is, therefore, accommodation for 12 patients suffering from one infectious disease.

The following is a list of the cases of illness removed from ships and treated in the Hospital during the year :—

Name of Ship	Date of Inspection	Where from	Disease
Nordweor	... Feb. 12	Brest ...	Erysipelas
Welfred ...	... March 9	" ...	"
Aline ...	... " 12	" ...	Typhoid Fever
St. Aubryn	... " 30	Spain ...	Erysipelas
Isle of Jersey	... April 25	Rotterdam	Typhoid Fever
Pembrock	... May 8	Spain ...	"
Methley Hall	... " 18	Currachee ..	Diarrhoea
John Ludwig	... " 18	Rotterdam	Dysentery
Mendoza	... " 19	Swansea ...	Measles
Vincenzo	... " 23	Marseilles ...	Diarrhoea
Emlfield	... " 23	" ...	Typhoid Fever
Inish Owen Head	... " 25	Antwerp ..	Small-pox
" "	... " 28	" ...	"
" "	... " 29	" ...	"
Knight of St. John	June 2	Bombay ...	Dysentery
Zimi ..	July 5	Mobile ...	"
Leckwith	... Aug. 10	Antwerp ...	Typhoid Fever
Biscaye ...	... " 28	Bilbao ...	Diarrhoea
Lord Templeton	... Sep. 15	London ...	Typhoid Fever
Ethelberga	... " 19	Taganrog .	Dysentery
Ephelstone	... " 24	London ...	"
Inchman	... " 24	" ...	Typhoid Fever

Name of Ship	Date of Inspection	Where from	Disease
Orient ...	Sept. 28	Havre ..	Typhoid Fever
Knight of St. George	Oct. 2	Bombay ...	Dysentery
Knight Companion	" 27	" ...	Diarrhœa
Apollo ...	Nov. 5	Canada ...	Typhoid Fever
Norwood ...	" 8	Bombay ...	Diarrhœa
Alpha ...	" 26	Watchett ...	Typhoid Fever
Flying Dragon	Dec. 1	Cardiff ...	"
Rockliff ...	" 3	Liverpool ...	Dysentery
The President	" 21	Monte Video	Typhoid Fever

The history of the more important cases of illness coming under my observation is given below.

On March 22nd, I visited the German barque "Helena" from Hamburg, having on board a seaman suffering from typhoid fever. He was immediately removed to the Hospital. The history of the case indicated that the disease was contracted in Hamburg, and that impure water was the probable cause.

On May 14th, I visited the "Julia" from Barnstaple, and found one of the crew suffering from typhoid fever. He was immediately removed to the Hospital. The disease in this case probably originated at Appledore where the patient had recently stayed. No sanitary defects were detected on board.

On May 21st, I visited the "Mendoza," lying in the East Bute Dock, and found one of the crew suffering from measles, which disease he had contracted from the captain's children during the voyage. The patient was removed to the Hospital, and the vessel disinfected.

On May 25th, my attention was called by the medical attendant to a case of small-pox on board the s.s. "Innis Owen Head," lying in the Roath Dock. It appears that the steamer left Bombay on April 14th, having on board a passenger who developed symptoms of small-pox shortly after leaving that port, and was landed at Suez on April 26th. On May 12th, two seamen were landed at Antwerp, suffering from the same disease. On May 24th, the day after the vessel arrived at Cardiff, the cook was taken ill. A medical man was sent for, who pronounced the disease to be small-pox, and called my attention to the case. I immediately visited the vessel, and ordered the patients' removal to the Hospital. On May 28th, the engineer was taken ill, and on the following day the steward, both suffering from small-pox; they were also removed to the Hospital. The steamer was thoroughly disinfected, the men's clothes destroyed, and thirty-five of the crew revaccinated. No extension of the disease occurred.

On July 6th, my attention was called to the Italian barque "Adele Accame" from Havre, lying in the Cardiff Roads. On visiting the vessel, I found on board the dead body of a seaman who had died during the voyage. The symptoms as described by the captain were those of lung disease. The crew were all healthy, and no other cases of illness had occurred on board.

On September 18th, a case of typhoid fever was reported on board the *s.s.* "Lord Templeton" from London, lying in the East Bute Dock. On visiting the vessel I found a sailor suffering from this disease, and caused him to be removed to the Hospital; he contracted typhoid fever in London. No sanitary defects existed on board.

On September 29th, I visited the barque "Orient," and found the steward suffering from typhoid fever; I caused him to be removed to the Hospital. The captain had also recently suffered from this disease. The ship's tanks contained dirty water, taken on board at Rouen, which in all probability caused the illness. Notice was served requiring owners to empty and clean tanks, and to take on board a pure supply of water.

On October 31st, I was called to the barque "Ermina," lying in the Roath Dock. The captain reported that during the voyage three men had died from fever. The vessel left Savannah on September 15th, the first case of illness dating from September 25th; this case terminated fatally on October 1st. Another sailor died on October 3rd, and again another death occurred on October 15th. Each man was stated to have suffered from fever, accompanied with diarrhoea. At the time of my visit I found one sailor convalescent; he had suffered from the same symptoms. They were probably all cases of typhoid fever, and the disease was doubtless originally contracted at Savannah. No other cases of illness occurred on board. All the crew were inspected and found well, and the vessel thoroughly disinfected.

On November 8th, I visited the barque "Apollo" from Nova Scotia, lying in the East Bute Dock, and found a seaman on board suffering from typhoid fever. The vessel left Nova Scotia on October 3rd, and the man was taken ill about October 20th. I examined the water on the vessel, and found it dirty and unfit for drinking purposes. In all probability this water was the cause of the illness. I caused the patient's removal to the Hospital, and ordered the captain to have the tanks cleaned, and to take on board a pure water supply. No other cases of illness had occurred during the voyage.

Thirty-five vessels were visited by your Medical Officer of Health during the year in consequence of information received from officers of H. M. Customs.

The systematic inspection of shipping has been carried out as far as possible. Notices have been served whenever sanitary defects were discovered on board vessels, which were in all cases complied with. The rapid development of the commerce of the port has proportionately increased the responsibilities of the Sanitary Authority with respect to the importation of infectious diseases. Cardiff has a constant shipping connection with the Spanish and Mediterranean ports, and is, therefore, peculiarly liable to the introduction of cholera and other infectious diseases from abroad.

Realising this danger, your Health Committee requested me to report on the methods now adopted for preventing the introduction of infectious diseases into the port, and to make any recommendation that I might think necessary for taking further precautionary measures. The following is an extract from my report upon this matter:—

“At your request I beg to submit to you the following information respecting the methods now adopted for preventing the introduction of infectious diseases into the Port of Cardiff by shipping. The Port Sanitary District of Cardiff extends from the Rumney River to Lavernock Point, and includes four docks—Roath Dock, East and West Bute Docks, and Penarth Dock, into which infectious diseases may be brought by vessels at any time. Small coasting vessels also enter the port and pass into the Glamorganshire Canal. Owing to the fact that there is no Custom House Boarding Station outside the Docks, no examination of vessels can be made previous to their admission, consequently infectious disease may be introduced into the Docks before the fact is made known to your officials; this, of course, does not apply to cholera, for the prevention of which disease special regulations are made by the Local Government Board.

“The presence of infectious disease in this port is ascertained at present by means of—1 Reports of Custom House Officers; 2 Reports of Pilots; 3 Notification (compulsory) by Ship Masters; 4 Notification (voluntary) by Medical Men, including the Medical Officer of the Hamadryad Hospital; 5 Inquiries by Medical Officer of Health and Inspector of Nuisances.

“The Quarantine Act provides that all disease whatsoever on board vessels entering a port, and not arriving coastwise, is

to be reported to the Customs. Quarantine Regulations also provide that certain printed questions shall be asked by Customs Officers to masters of vessels liable to quarantine, *i.e.* vessels arriving from the Mediterranean ports, or from any other port which Her Majesty shall from time to time declare by order of Council that infectious disease may be brought. In answering these questions the master would be obliged to state if he had any cases of illness on board during the voyage. His answers are taken down in writing, and the truth thereof sworn to before Officers of Customs. In the case of foreign vessels not liable to quarantine, verbal questions are asked by the Customs Officer, but no enquiries are made as to the health of crew previous to vessels leaving last port of loading cargo. No questions relating to health are asked in cases of vessels arriving coastwise. Custom House Officers, at their earliest convenience, forward to the Sanitary Authority any information which they consider necessary.

"Pilots are instructed by the Pilotage Board to ask certain questions of masters of vessels relating to the present and past health of crew, and the secretary of that Board sends, at his convenience, any information to the Sanitary Authority which he may think necessary.

"Medical men in attendance on cases of infectious disease on board ships notify the fact occasionally to the Sanitary Authority, and the Medical Officer to the Hamadryad does so invariably.

"The Regulations of the Port Sanitary Authority, made under the powers given by the 130th Sec. Public Health Act, and approved by the Local Government Board, provide that every master of a ship arriving in the Port of Cardiff with any person on board suffering from an infectious disease, shall, on the arrival of the ship at the Custom House Boarding Station, send notice to the Sanitary Authority. The Port Sanitary Inspector informs me that no notice has ever been received from this source since he has held that appointment. The 124th Sec. Public Health Act gives power to remove to a hospital any person suffering from an infectious disease who is on board any ship.

"Special Regulations are contained in a General Order of the Local Government Board which apply to vessels infected with cholera. These regulations require the Custom House Officers to detain the vessel at some place of anchorage fixed by the Port Sanitary Authority until she is examined by the Medical Officer of Health, upon whom devolves the duty of taking proper precautions to prevent the introduction of cholera into the port.

"Although valuable information is at times derived from these various sources, it is naturally uncertain and imperfect in its character, the primary duty of Custom House Officers, Pilots, and Ship Masters does not consist in the notification of infectious diseases, moreover, they are not specially trained for such duties, and mistakes in the nature of a disease are likely to occur. From my own experience in the administration of Port Sanitary Districts, and from the perusal of the Reports of other Health Officers of Ports, I am convinced that it is unwise to rely entirely upon this information for preventing the importation of infectious diseases into a district, and am of opinion that these methods of obtaining information should be supplemented by a constant and efficient supervision on the part of your officers under the powers given by the 92nd Sec. Public Health Act.

"The Port Sanitary Authority is primarily responsible for the sanitary condition of the district, and it is the duty of the Health Officer to cause a systematic inspection of the shipping to be made in order that he may keep himself informed of the conditions injurious to health existing on board vessels in the district. The 110th Sec. Public Health Act provides that for the purposes of the Act relating to nuisances, any ship or vessel within the district of a Local Authority shall be subject to the jurisdiction of that Authority in the same manner as if it were a house.

"Taking into consideration the extent of your district and the frequent communication with foreign Ports from whence dangerous infectious diseases have from time to time been imported, I would advise that a systematic inspection be made of all shipping entering the Port, in order that any nuisance injuriously affecting persons on board any vessel may be immediately abated. This inspection could not be properly undertaken by your Chief Inspector of Nuisances who is also Port Inspector, and Inspector under the Canal Boats' Act. I would, therefore, suggest that an Assistant Inspector be engaged to act under that officer, and that he should reside near to the Docks and have an office at which communications could be received either at his residence, or at some convenient place within easy reach of the shipping. It would be his duty to examine the list of vessels arriving in the Port, to make an inspection of the shipping, to make observations and report as to nuisances, to place himself in constant communication with Custom Officers, Dock Police, and others connected with shipping, and to perform generally the duties of Inspector of Nuisances under the direction of the Chief Inspector.

"Your late Medical Officer of Health, in his last Annual Report, states that 12,456 vessels entered the Port of Cardiff during the year 1887, and he calls your attention to the difficulties experienced in carrying out an effective sanitary supervision of ships arriving at this Port, and mentions that, in order to perform this duty effectively, a larger staff of inspectors would be required.

"The following information is derived from the Annual Report of the Medical Officer of Health for Bristol, and will show to some extent the method of inspection adopted in that port. The Port Inspector at Avonmouth inspects all vessels entering Avonmouth and Portishead Docks. The number of ships inspected during 1887 was 1,461; the number of notices served to abate nuisances on board ships was 388, in addition 255 ships were spoken in the river, and copies of the Port Sanitary Regulations served. The Port Sanitary Authority has an office at Avonmouth, where the Inspector, who is in constant communication with the Customs and Pilots, is in daily attendance.

"At Newcastle-on-Tyne 1,600 vessels are inspected annually, and in Liverpool 4,182 vessels were inspected during the year 1887. I mention these facts in order to indicate what is done in other ports with a view of preventing the importation of disease, and to point out that it is only by a strict and efficient sanitary supervision that we can hope to prevent dangerous infectious diseases entering and spreading in this port."

CANAL BOATS.

The only Canal having direct communication with Cardiff is the Glamorganshire Canal, which enters the Borough on the northern boundary and passes in a southerly direction to the Docks.

The duties of measuring and inspecting the boats are discharged by Mr. Vaughan, Port Sanitary Inspector, who in November, 1887, was appointed inspector under the Canal Boats Acts, 1877 and 1884. Before the date of this appointment the provisions of these Acts were not put in force.

During the year 1888 forty-three canal boats were visited and inspected, and the owners having complied with the regulations were registered. No cases of sickness or overcrowding were discovered on board, and the boats generally were found to be in a good sanitary condition. As a rule the Canal Boats on this part of the Canal do not carry women or children, so that infectious diseases are not of frequent occurrence.

On the 21st July last, Mr. J. Brydone, Inspector of Canal Boats under the Local Government Board, visited Cardiff, and examined several Canal Boats, and the books and reports connected with the Acts. He expressed his satisfaction with the work which had been carried out by your Inspector.

I have the honour to be, Gentlemen,

Your obedient Servant,

EDWARD WALFORD, M.D.,

Medical Officer of Health.